PB81-152183

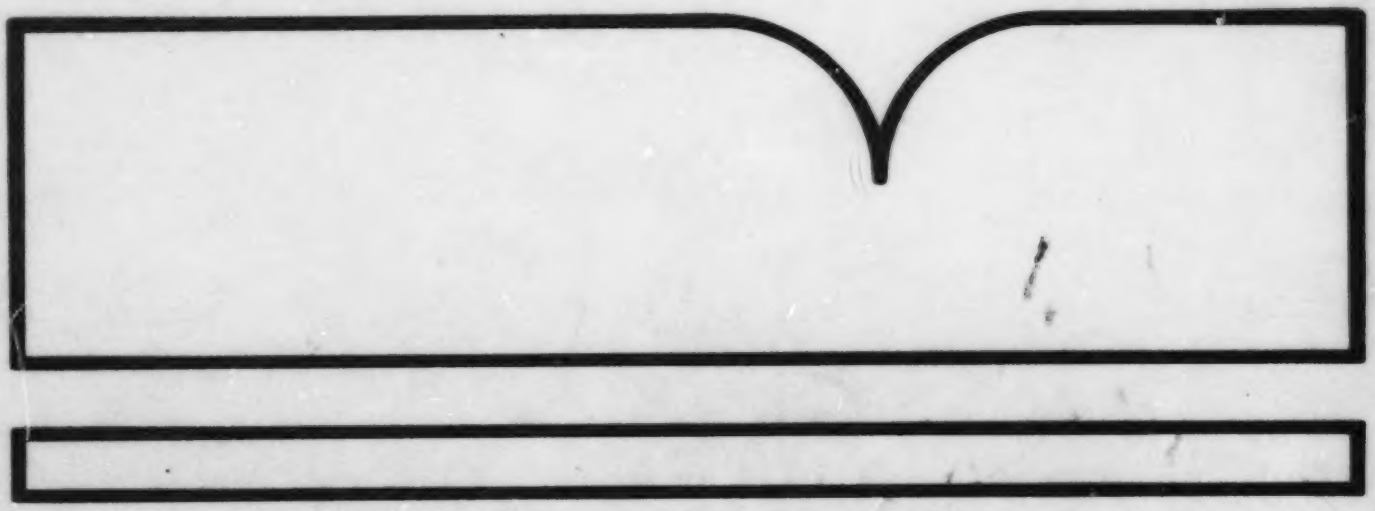
Development and Application of a Water Supply Cost Analysis System. Volume I

ACT Systems, Inc.
Winter Park, FL

Prepared for

Municipal Environmental Research Lab.
Cincinnati, OH

Jul 80



U.S. Department of Commerce
National Technical Information Service
NTIS.

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA-600/2-80-012a	2.
3. RECIPIENT'S ACCESSION NO. PB81-152183	
4. TITLE AND SUBTITLE DEVELOPMENT AND APPLICATION OF A WATER SUPPLY COST ANALYSIS SYSTEM Volume I	5. REPORT DATE July 1980 (Issuing date) 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) James I. Gillean, William L. Britton, Jr., John H. Brim, and Robert M. Clark	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS ACT Systems Inc. Winter Park, Florida 32789	10. PROGRAM ELEMENT NO. C61C1C SOS#1 Task 39 11. CONTRACT/GRANT NO. 68-03-2506
12. SPONSORING AGENCY NAME AND ADDRESS Municipal Environmental Research Laboratories—Cin., OH Office of Research and Development U.S. Environmental Protection Agency Cincinnati, Ohio 45268	13. TYPE OF REPORT AND PERIOD COVERED Final Report 9/78-9/79 14. SPONSORING AGENCY CODE EPA/600/14

15. SUPPLEMENTARY NOTES
See also Volume II (EPA-600/2-80-012b)
Project Officer: Robert M. Clark (513) 684-7488

16. ABSTRACT

The Environmental Protection Agency is concerned with the Safe Drinking Water Act's economic impact on the water supply industry. Experience has shown that although most utilities maintain an accounting system, the data provided by the system are maintained in different formats and are therefore incompatible among utilities. Few systems provide continuous and adequate cost information directly.

To help remedy this deficiency, the Drinking Water Research Division has initiated a program to develop standardized techniques for analyzing data within a utility accounting framework. This program is described in two volumes. Volume I (this volume) describes the development and application of this system to Kenton County, Kentucky Water District No. 1.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Accounting Cost Analysis Cost Center Cost Effectiveness Cost Engineering Water Supply	Product Costing	13B

18. DISTRIBUTION STATEMENT Release to Public	19. SECURITY CLASS (This Report) Unclassified 20. SECURITY CLASS (This page) Unclassified	21. NO. OF PAGES 22. PRICE

EPA Form 2220-1 (Rev. 4-77)

* U.S. GOVERNMENT PRINTING OFFICE 1980-657-165/0031

PB81-152183

EPA-600/2-80-012a
July 1980

DEVELOPMENT AND APPLICATION OF A WATER SUPPLY COST ANALYSIS SYSTEM

Volume I

by

James I. Gillean
William L. Britton, Jr.
John H. Brim
ACT Systems, Inc.
Winter Park, Florida 32789

Robert M. Clark
Municipal Environmental Research Laboratory
Cincinnati, Ohio 45268

Contract No. 68-03-2506

Project Officer

Robert M. Clark
Drinking Water Research Division
Municipal Environmental Research Laboratory
Cincinnati, Ohio 45268

MUNICIPAL ENVIRONMENTAL RESEARCH LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

DISCLAIMER

This report has been reviewed by the Municipal Environmental Research Laboratory, U.S. Environmental Protection Agency, and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the U.S. Environmental Protection Agency, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

FOREWORD

The Environmental Protection Agency was created because the public and the federal government were increasingly concerned about the dangers of pollution on the health and welfare of the American people. Noxious air, foul water, and spoiled land are tragic testimonies to the deterioration of our natural environment. The complexity of that environment and the interplay among its components require a concentrated and integrated attack on the problem.

Research and development is that first step in problem solution, and involves defining the problem, measuring its impact, and searching for solutions. The Municipal Environmental Research Laboratory develops new and improved technology and systems: 1) to prevent, treat, and manage wastewater, solid and hazardous waste, and pollutant discharges from municipal and community sources; 2) to preserve and treat public drinking water supplies; and 3) to minimize the adverse economic, social, health, and aesthetic effects of pollution. This publication is a product of that research and is a most vital communications link between the researcher and the user community.

The Safe Drinking Water Act of 1974 establishes primary health-related standards and secondary aesthetics-related but nonenforceable guidelines for drinking water supplies. These standards will bring about a fundamental examination of the way water is handled before it is delivered to the consumer. Many of these changes will have an economic impact on the affected water utilities. This report describes a cost analysis system that was developed to analyze a water utility's operating and maintenance cost data. The cost analysis system provides the manager and other interested parties with an insight into a water utility's performance, and defines, by unique cost centers, those areas where costs can be monitored.

Volume I of this report outlines the background, development, and application of the cost analysis system. Volume II provides the computer program documentation developed to operate the system.

Francis T. Mayo
Director
Municipal Environmental Research Laboratory

ABSTRACT

The Environmental Protection Agency is concerned with the Safe Drinking Water Act's economic impact on the water supply industry. The Environmental Protection Agency initiated an ongoing program to gather and examine cost data from utilities across the country on which to establish a data base for water supply cost.

Experience has shown that although most utilities maintain an accounting system, the data provided by these systems are maintained in different formats and are therefore incompatible among utilities. Few systems provide continuous and adequate cost information directly.

As a result of this effort, and because of the Act's emphasis on economics, the Environmental Protection Agency initiated a research program to develop standardized techniques for analyzing costs within a utility accounting framework. The system has been implemented successfully in Kenton County Water District No. 1 in Kentucky. Overall, the performance of the system has been impressive. In addition to providing useful management reports, the cost analysis system has assisted in improving the existing Kenton County Water District financial reporting system. The utility director has used the data to make key decisions regarding operations and for establishing billing rates to selected users, as well for a general rate re-evaluation study. This program is described in a two-volume report. Volume I describes the development and functions of this system and its application to Kenton County, Kentucky, Water District No. 1. Volume II contains the programming documentation and operating instructions for the cost analysis system.

This report is submitted by ACT Systems, Inc., in partial fulfillment of Contract No. 68-03-2506, Section II, under the sponsorship of the U.S. Environmental Protection Agency.

CONTENTS

	Page
Foreword	iii
Abstract	iv
Figures and Tables	vi
Abbreviations and Definitions	vii
Acknowledgments	viii
1. Introduction	1
Background	1
Scope of the Effort	2
2. Development of the Cost Analysis System	4
Cost Analysis Concept	6
Kenton County, KY Water District No. 1	8
Concept of Output Reports	9
Level IV Report - Detail of Costs by Cost Center	9
Level III Report- Summary of Costs by Function	13
Level II Report - Cost Comparison Report	16
Level I Report - Summary of Systems Information	19
Water Supply Data Analysis Report	21
Concept of the Cost Classification System	24
Cost Allocation Concept	27
Concept of Interface with Financial Reporting System	29
Supplemental Accounting Reports	31
Payroll Report	31
Requisition from Stock Report	31
Payment Authorization Report	31
Service Contract Report	31
Miscellaneous Transactions Report	40
General Ledger Account Summary	40
3. Cost Analysis System Operations	44
Cost Data Flow Through the Cost Analysis System	44
Monthly Input Data	46
Annual Input Data	46
System Maintenance	52
New General Ledger Accounts	52
New Cost Center Numbers	55
Changes to Permanent Files	55
Computer Operations	55
4. Conclusions and Results	56
References	59
Appendices	
A. Kenton Water District-Covington Cost Center Identifications	60
B. Kenton Water District General Ledger Accounts	63
Glossary	70

FIGURES

Number		Page
1	Water utility simplified schematic	5
2	Function and cost category information	7
3	Kenton Water District No. 1 service area	10
4	Level IV report - detail of cost by cost center	12
5	Level III report - summary of cost by function.	14
6	Level II report - cost comparison	17
7	Level I report - summary of systems information	20
8	Water supply data analysis report	22
9	August 1978 year-to-date cost of water production by pressure zone in the Kenton Water District delivery system	25
10	Cost classification system	26
11	Interface of cost analysis system with financial reporting system	30
12	Payroll report	32
13	Requisition from stock report	34
14	Payment authorization report	36
15	Service contract report	38
16	Miscellaneous transactions report	41
17	General ledger account summary	43
18	Cost data flow through the cost analysis system	45
19	Payroll input form	47
20	Requisition from stock input form	48
21	Payment authorization input form	49
22	Service contract input form	50
23	Miscellaneous transactions input form	51
24	Depreciation entry form	54

TABLES

1.	Kenton Water District Storage and Pumping Facilities	11
2.	Depreciation Summary	53

ABBREVIATIONS AND DEFINITIONS

$/MG	— cost per million gallons
RPW	— revenue-producing water. The water measured as metered consumption and paid for by wholesale and retail customers in the service area
NARUC	— National Association of Regulatory Utility Commissioners
O&M	— Operations and Maintenance

METRIC CONVERSION TABLE

English Units	Metric Equivalents
1 foot	0.305 meters
1 mile	1.61 kilometers
1 sq mi	2.59 sq kilometers
1 mil gal	3.79 thou cu meters
1 $/mil gal	0.26 $/thou cu meters

ACKNOWLEDGMENTS

The staff of Kenton County, Kentucky, Water District No. 1 participated in the development and implementation of the cost analysis system described in this report. The cooperation and active support of Mr. Victor C. Fender, General Manager, and Mr. Malvern Connett, Office Manager, are gratefully acknowledged.

The following individuals are acknowledged for their review and advice on the contents of the report:

Mr. James Kelly, Madison Water Utility, Madison, WI
Mr. Harvey Minnigh, Downingtown Municipal Water Works, Downingtown, PA
Mr. Robert Ford, Dallas Water Utilities, Dallas, TX
Mr. Theodore Pope, Orlando Utilities Commission, Orlando, FL
Mr. David Kittredge, Manchester Water Works, Manchester, NH
Mr. Curtis Fain, EPA Region IV, Atlanta, GA
Mr. David Peterson, Department of Water & Gas, Duluth, MN

SECTION 1

INTRODUCTION

BACKGROUND

The Safe Drinking Water Act of 1974 (PL-93-523)[1] will necessitate a fundamental reexamination of the ways in which drinking water is supplied to the American public. A primary feature of the Act is that the economics and cost of water supply and water delivery must be considered before regulations are promulgated. In 1974 a two-year study of selected water utilities was undertaken, whereby data were collected from at least one Class A water utility (revenues greater than $500,000 per year) in each of the ten regions of the U.S. Environmental Protection Agency (EPA).[2] The purpose of the study was to collect data in such a manner that the resulting information could be easily compared among utilities, thus providing an understanding of some of the fundamental factors that affect the cost of water supply and water utility management.[3]

One conclusion resulting from the investigation was that although each of the selected utilities kept financial records, and in some cases extensive ones, the data among utilities varied to a marked degree. Another conclusion was that many of the records were kept primarily for accounting purposes and had little relation to the short- and long-term operational needs of the utility managers. After a careful analysis of the data flow and information transfers of a number of large and small utilities, the investigators developed a technique for data collection and analysis intended to fulfill both managerial and accounting needs. This technique, which was based on a matrix concept, was tested by means of a water supply simulation model developed by the Drinking Water Research Division in Cincinnati. The technique having proven both effective and efficient in a hypothetical situation, was implemented in Kenton County, Kentucky, Water District No. 1 and was further refined and modified based on the operational experience. Both the system and the experimental results are described in this two-volume report. This volume (Volume I) contains a general description of the system and its application. Volume II contains detailed flow diagrams and charts related to the computer program developed as a result of the Kenton County application.

The EPA's responsibility for cost evaluation is primarily in terms of technological modifications that may be required to meet the Safe Drinking Water Act's definition of maximum contaminant levels (MCL's). However, an understanding of any cost impacts associated with treatment modifications required by the Act is virtually impossible if distinctions cannot be made

between the modification costs and the costs normally incurred in delivering water to the customer. The system described in this report is designed as a tool for making these distinctions. Moreover, it can be used as a tool for managing technology in an efficient manner, and as such can be useful in terms of providing technical assistance to the states and municipalities for public water system supervision programs. The results of this cost analysis research should provide a basis for the conduct of future studies on the costs of implementing the regulations.

A review of the guidelines established by Governmental Accounting, Auditing, and Financial Reporting (GAAFR)[4] and AICPA Auditing and EDP, was conducted to ensure that the system would conform to accepted accounting principles and practices. It should, however, be emphasized that the cost analysis system discussed herein is not a formal cost accounting system although it is discussed in a cost accounting context. This report provides the results of a carefully considered and structured approach for retrieving, summarizing, and analyzing water supply and water utility management cost data. As such, the investigators hope that it will ultimately provide a useful tool for water supply planners and decision makers.

SCOPE OF THE EFFORT

This section contains a general discussion of the cost analysis system. Details of the system are more completely defined in the development section of this report. The objectives of the cost analysis system development study were as follows:

a. Develop a system that would furnish complete cost information by 1) defining the costs of water production at identifiable cost centers within the utility treatment and distribution system, 2) assigning costs to the water as it flows through the treatment and distribution system, 3) providing managers and decision makers with data reflecting the system's performance, and 4) defining areas where cost should be monitored closely.

b. Develop a system generally applicable to water supply utilities.

c. Demonstrate its application in an operational setting.

The first step in the research was to identify information outputs from the system. These outputs were identified as follows:

a. Four levels of cost analysis reports designed to provide information to specific levels of management.

b. A cost analysis report to assign all costs of moving the water from the intake to the point of consumption.

c. Supplemental accounting reports to provide an audit trail and summarize financial data for entry into the general ledger.

After the outputs were established, efforts were directed toward acquiring and verifying the necessary inputs and assigning data to the cost centers. The cost centers are, in many cases, equivalent to physical points within the system. A four-digit cost center identification system was established to accumulate costs at identifiable locations within the utility system. Four basic allocating techniques were also developed and built into the system to ensure that costs would be assigned to appropriate centers.

After costs have been allocated to cost centers within the system, they are then assigned on an incremental basis in $/MG to revenue-producing water (RPW) flowing through the system to the service zones. Using this technique, costs can be determined by cost zone and for the system as a whole.

The system is designed to allocate and trace the costs of water production with the intention of making it applicable to many water utilities. However, the system was first implemented and tested at Kenton County, Kentucky, Water District No. 1 where it is now in operation.

The cost center numbering system for the Kenton Water District is included in this report as Appendix A, and the cost centers keyed into the general ledger accounts are included as Appendix B. A listing of the terms as used in this report is presented in the Glossary.

The concepts, methods, and procedures detailed in Section 2 of this report follow closely the order of development of the cost analysis system. In addition, Section 3 presents information on the cost analysis system operation.

SECTION 2

DEVELOPMENT OF THE COST ANALYSIS SYSTEM

The cost study discussed in the introduction required that financial data gathered from the utilities for the purpose of identifying their costs must be documented in a format allowing cost to be compared between utilities. Since each utility differed in physical, management, and financial structures, this was a difficult requirement to meet. The solution to the problem was reached by using the functions of a water system as the basic format. Water utilities may differ in characteristics, but generally speaking, all are similar in function in that each must acquire, treat, and deliver water. Therefore, if the data from each utility could be rearranged so that costs associated with acquisition, treatment, and delivery of water were identified separately; a cost comparison between utilities could be accomplished.

Figure 1 is a simplified schematic of a typical water utility with a reservoir raw water source showing the concept of dividing the water utility into the functions of acquisition, treatment, and delivery. This technique can be adapted to all water utility systems regardless of their physical structure. Use of this concept allowed identification of costs not only to the specific functions of acquisition, treatment, or delivery but also to the subfunction level. For example, using Figure 1, subfunctions of acquisition include source of supply, reservoir, pumps, and transmission lines. Subfunctions of delivery include pumps, storage tanks, transmission, and distribution.

Based on this system of cost analysis, the cost of water is identified at various locations in the utility system, and as the water moves from its source to its destination, costs are transferred from the cost centers to the water. For example, as shown in Figure 1, the acquisition cost consists of all costs incurred to move water to the treatment plant. When the water enters the treatment plant, the cost of treating the water is added to the acquisition cost. Cost also is incurred by additional pumping, located within the treatment plant, to move the water into the delivery area. However, this is considered a subfunction of delivery. In addition, costs such as transmission and distribution are accumulated in each zone. The transmission costs are those for moving water to zone 1 and zone 2. The distribution costs include the network of mains and laterals that deliver water to customers in zones 1 and 2. Analysis of the system in Figure 1 reveals that an element of the pumping cost for pump No. 2 is incurred to move water through zone 1 to zone 2, and another cost element is incurred in delivering water through the laterals to customers in zone 1. Similarly,

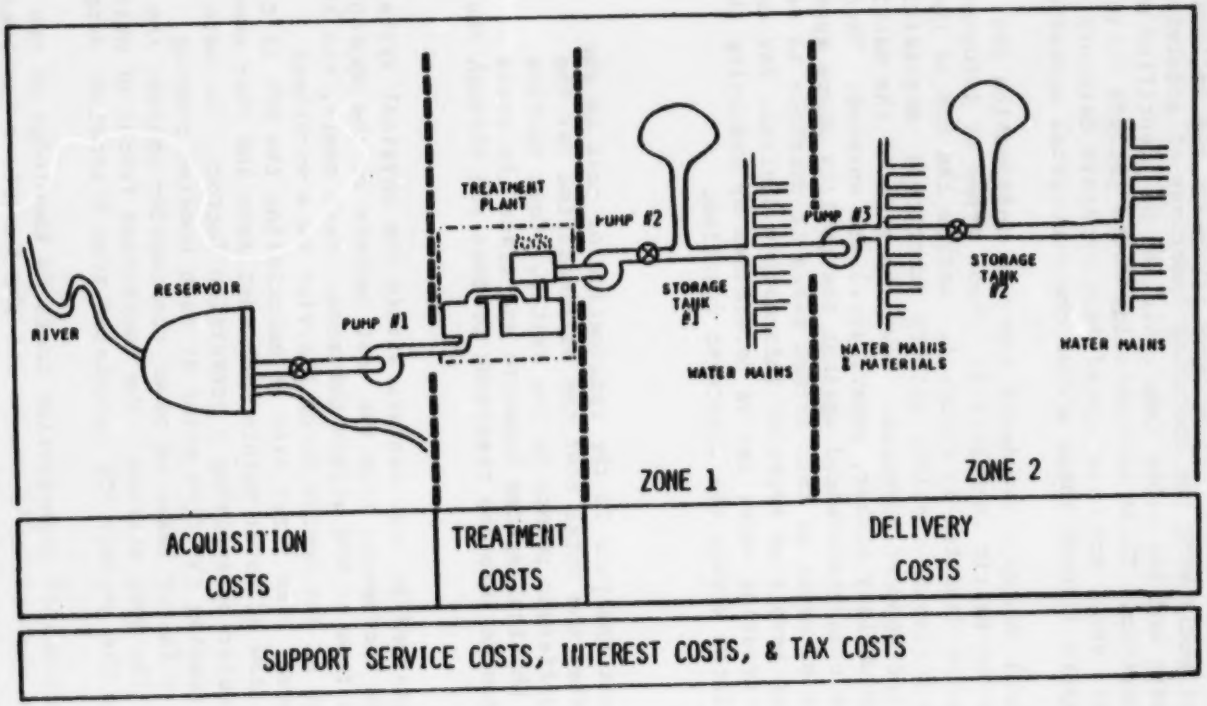


Figure 1. Water utility simplified schematic.

the transmission mains include both a transmission cost element and a delivery cost element. Storage costs are assigned only to the zone in which the storage facility is located because no element of this cost is applied to any other zone.

Two types of costs were identified as this technique was refined. One type was associated directly with the operating functions of acquisition, treatment, and delivery; and the other type could not be identified with any specific operating function. These non-operating costs include billing, accounting, management, etc., and were placed in a separate category called support services. Figure 1 shows these across the functional operation.

Within this general concept, two basic types of information are required, as shown by the matrix in Figure 2. These types of information match the physical system depicted in Figure 1. Across the top of the matrix are listed the following specific utility functions: acquisition, treatment, delivery, and support services. Down the side of the matrix all costs of operating the utility (labor, power, etc.) are entered. These cost categories can be cross-referenced against the utility where appropriate. Documentation of costs in this format makes it possible to retrieve and display the various levels or types of information desired. For example, the cost of labor for treating water can be determined by examining the first cost category listed within the treatment function.

COST ANALYSIS CONCEPT

The concept of cost analysis is the application of cost to the movement of water so that the total cost can be identified for the delivery of water to different points in the system. Cost centers identified within the physical system localize and trace the costs as the water moves from the source into the treatment process and through the delivery system.

Costs are first charged to cost centers within the physical system and are then transferred in increments from the cost centers to the appropriate cost zone based on the flow of RPW within the zone. Each month, the RPW by cost zone is calculated at the Kenton Water District on a worksheet designed for this purpose. The first step in calculating the RPW is to determine the metered flow of water within each cost zone and then convert this figure to billed water by applying a conversion factor. The metered flow is determined by reading the flow meter at each booster pumping station or by applying a factor based on power consumption against the rated flow capacity of the pump station. The conversion factor of metered flow to billed water is the average RPW calculated from historical data.

Inherent in the process of transferring costs is knowledge of the physical arrangement of the utility's assets and the functions involved. Because the cost analysis report is oriented to cost zones, the location of the pumping and storage cost centers with respect to the cost zones must be known.

COST CATEGORY	WATER UTILITY FUNCTION			
	ACQUISITION	TREATMENT	DELIVERY	SUPPORT SERVICES
LABOR				
POWER				
CHEMICALS				
MATERIALS				
MISCELLANEOUS				

Figure 2. Function and cost category information.

KENTON COUNTY WATER DISTRICT NO. 1

The Kenton County Water District No.1, the first water district established in the State of Kentucky, developed its original water supply system by purchasing the Dixie Highway Water Company system in 1926. During this period of time, treated water was being purchased from the City of Covington, Kentucky and delivered by the District to its customers.

In 1954, the District built a new water intake on the left bank of the Licking River, within the area of the Markland Dam, approximately 4-3/4 miles upstream from the Ohio River, and a treatment plant located at Grant and Howard Avenues in Taylor Mill, Kentucky. Presently the treatment plant contains eight mixed media filters and has a 12.0 MGD rated capacity. After the raw water has been treated, it flows into a 930 MG capacity clearwell.

Treated water is pumped by two primary pumping stations, one at the treatment plant and one at Dudley Pike, into the distribution system. The distribution system, containing approximately 160 miles of pipe, consists of three pressure levels.

The first pressure level, a 5.0-MGD storage tank, is filled directly from the treatment facility or by the pumping capacity at the treatment plant.

The second pressure level, which provides water to the largest service area, is supplied by gravity from three elevated storage tanks or by the capacity of the main booster pump station located at Dudley Pike.

The third pressure level is fed by gravity from two elevated storage tanks located in the Northern Kentucky Industrial Foundation Park and the City of Florence or by the two booster stations located on Turkey Foot Road at Lafayette Avenue.

In addition to processing its own water supply, the Water District maintains an emergency connection with the City of Covington's Waterworks System. This tie-in is situated adjacent to the Dixie Highway near the northeastern limits of the Water District's service area, and is being maintained for the mutual benefit of both water operations.

Currently, the Kenton County Water District provides water to about 15,600 customers of the northwestern portion of Kenton County, Kentucky, in a 40-square-mile retail service area. Treated water is supplied to 12 townships, an industrial park, and to unincorporated areas of Kenton County lying within the service area. In addition, water is supplied to the City of Florence and to the International Airport.

In July 1977, the Kenton Water District acquired the operating control of the City of Covington, Kentucky, Water Utility. A separate cost analysis system was implemented for Covington, since bonding restrictions required that the Covington accounting be separate from that of the Kenton Water District. Therefore, reports, similar to those of the Kenton Water District, are prepared for the Covington system.

Figure 3 is a map of the Kenton County Water District No. 1 service area, showing the locations and relative sizes of the three pressure zones. Table 1 lists the Kenton Water District's storage and pumping cost centers by zone location and cost center identification.

CONCEPT OF OUTPUT REPORTS

As mentioned previously, the first step in the development of the cost analysis system was to identify the desired outputs. Once the outputs were established, appropriate input data were acquired, verified, and assigned to the proper cost centers. It was determined that the cost analysis system would produce two types of output: cost analysis reports and supplemental accounting reports.

Four levels of cost reports were designed to provide information for specific levels of management, ranging from detailed to summary reports. Samples of all reports are provided in this section.

The Level IV report was developed to provide very detailed cost information. This report assigns input cost categories to each cost center by account description. The Level III report relates the detailed cost by broader, standardized categories. The Level II report compares actual expenditures with budgeted amounts and with expenditures for the previous year. The Level I report summarizes the cost data and identifies the $/MG of RPW for the major cost centers and the total cost for the system. Costs for the previous month, the previous year, and the budgeted amounts are also compared on the Level I report.

The cost analysis report allocates cost to the movement of water through the system from the intake to the point of consumption. It identifies costs by delivery zone, including indirect costs (by allocation). In this manner, zoned and system costs can be examined.

Detailed descriptions of the output, including reduced reproductions of the computerized reports, are provided below.

Level IV Report - Detail of Costs by Cost Center

The Level IV output (Figure 4) is in matrix form, with the horizontal rows representing the general ledger cost accounts and the vertical columns representing the cost centers. The dollar amount of cost by general ledger account for each cost center for the current month is displayed at the appropriate intersection of a row and a column.

Figure 4 presents a portion of the acquisition function for Kenton County as an illustration of the Level IV report. However, separate reports are programmed in the system for each utility function: acquisition, treatment, delivery, and support services. Each report contains cost data relative to its particular functional title. For example, all acquisition costs would be printed in the report title "Acquisition Cost".

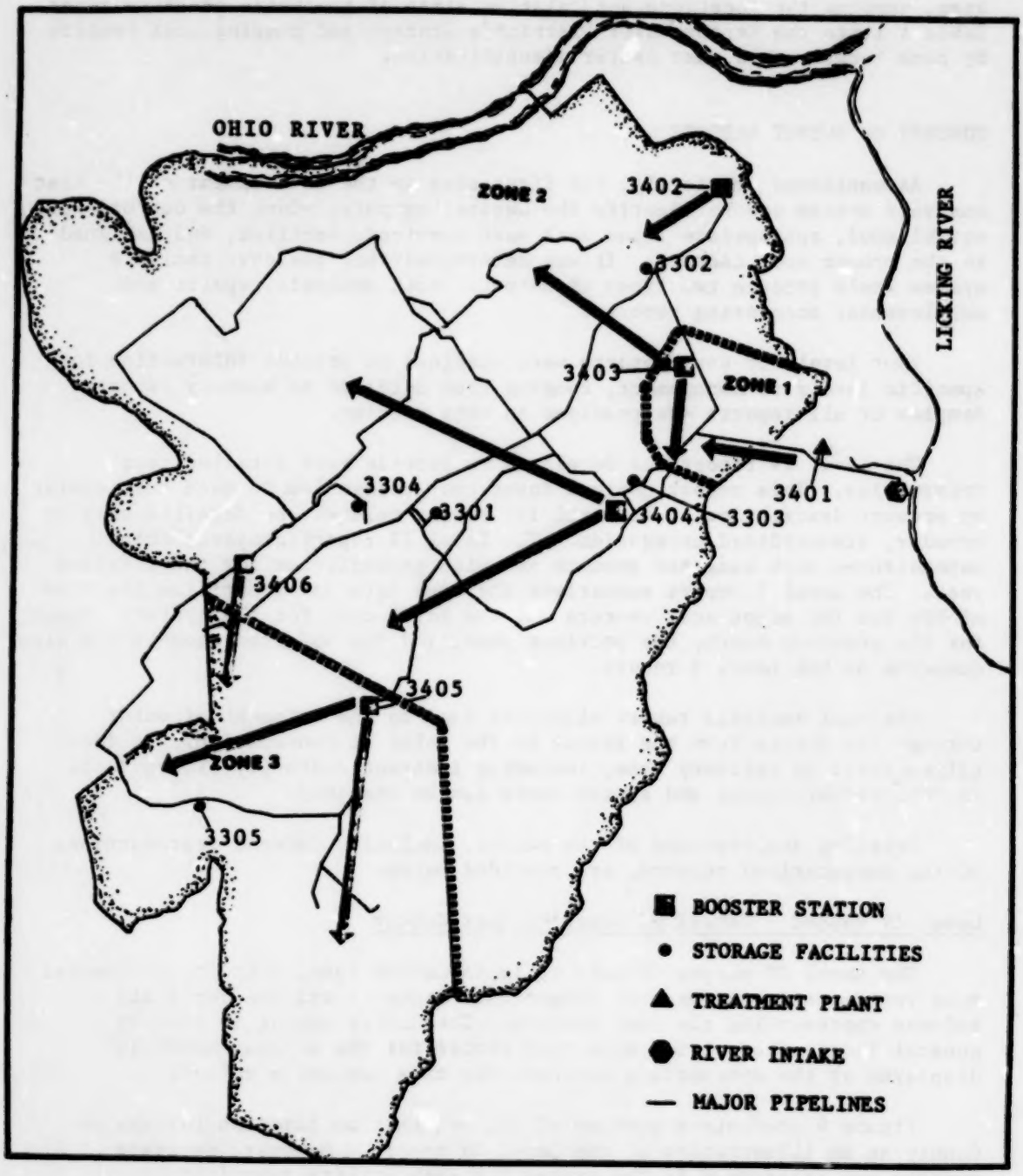


Figure 3. Kenton County Water District No. 1 service area.

TABLE 1. KENTON WATER DISTRICT STORAGE AND PUMPING FACILITIES

Facility	Location	Cost center
Storage:		
Dudley Pike	Pressure zone 1	3301
Barrington Road	Pressure zone 2	3302
Edgewood	Pressure zone 2	3303
Kenton Lands	Pressure zone 2	3304
Industrial Park	Pressure zone 3	3305
Pumping:		
Kenton County Plant	Pressure zone 1	3401
Dixie Highway	Pressure zone 2	3402
Kyles Lane	Pressure zone 2	3403
Dudley Pike	Pressure zone 2	3404
Turkey Foot	Pressure zone 3	3405
Lafayette	Pressure zone 3	3406

DATE: AUGUST 31, 1978

LEVEL IV REPORT OF
ACQUISITION COSTS FOR
KENTON COUNTY KENTUCKY

COST CATEGORY DESCRIPTIONS	ACQUISITION			
	RIVER	TRANSMISSION	PUMP STATION	PURCHASED WATER
OPER SUPERVISION	37.00			
OPER ENGINEERING	38.50		6.82	
OPERATION LABOR	104.04			
OPERATION - OTHER EXP				
WATER PURCHASED				
BUILDING SERVICES				
GROUNDS MAINTENANCE				
OTHER EXPENSES			.09	
MAINT SUPERVISION	37.00			
MAINT ENGINEERING				
MAINT STRUCT & IMPROVEMENTS - LABOR				
MAINT STRUCT & IMPROV - OTHER EXP				
MAINT OF RIVER INTAKE - LABOR				
MAINT OF RIVER INTAKE - OTHER EXP				
MAINT OF SUPPLY MAINS - LABOR				
MAINT OF SUPPLY MAINS - OTHER EXP				
POWER PURCH SOURCE			4758.94	
COMMUNICATIONS			39.90	
LUBRICANTS				
AUTO MAINTENANCE				
AUTO GAS & OIL			19.51	

Figure 4. Level IV report - detail of costs by cost center.

All operating and maintenance costs, excluding interest and taxes, are included in the Level IV report. The cost categories descriptions represent the current Kenton County general ledger cost accounts. For example, Operation Supervision is a general ledger account in the O&M fund used to record costs for source of supply, pumping, water treatment, transmission and distribution, and customer accounts.

In this example, all dollars charged to the Licking River intake structure through the Operation Supervision account will appear in the matrix intersection of the first row and the first column. Total dollars expended through the Operation Supervision account chargeable to the transmission line connecting the Licking River intake structure and the Kenton County treatment plant are shown at the intersection of the first row and the second column. The total of any row will give the total dollars expended for that general ledger cost account for the subject function. The totals of the columns represent the total dollars charged to each cost center of the function. Since costs are accumulated at identifiable cost centers within the utility system, all cumulative costs, for a particular physical point or cost center can be related to the Kenton Water District service area map shown in Figure 3.

Level III Report - Summary of Costs by Function

Figure 5 is a sample of the Level III report. This report is a summary by month and year to date of the information in the Level IV report. Again, a matrix format is used, with the columns representing the six major cost center classifications (functions): acquisition, treatment, delivery, support services, interest, and taxes. Because taxes vary depending on the contractual arrangement of the utility, a subtotal column shows the total cost before taxes.

The rows in the Level III report represent standard cost categories independent of the chart of accounts used by the utility. They are summaries of chart of accounts items. These cost categories are designed to be constant, whereas the nomenclature of general ledger accounts varies from year to year and from utility to utility, thus making comparisons impractical. The major standard cost areas chosen for this study are as follows: 1) payroll costs, 2) other direct costs, 3) depreciation, and 4) interest and taxes.

In this output, the payroll costs include gross pay and payroll benefits only. All nonlabor costs are listed as other direct costs. Payroll costs comprise the following subclassifications:

a. Management and supervision - Gross pay for all managers and supervisors of all divisions, including operations, maintenance, and support services.

b. Operations labor - Gross pay to personnel operating the facilities identified with the functions of acquisition, treatment, or delivery.

MONTHLY
ENDING: AUGUST 31, 1978

LEVEL III SUMMARY OF COST
FOR
KENTON COUNTY KENTUCKY

FUNCTION:		ACQUISITION	TREATMENT	DELIVERY	SUPPORT SERVICES	INTEREST	TOTAL	TAXES	TOTAL WITH TAXES
COST CATEGORY									
PAYROLL COST:									
MANAGEMENT AND SUPERVISION	MONTHLY	74.00	296.00	684.50	1,422.80		2,477.30		2,477.30
	YTD	666.37	2,667.50	6,992.63	15,218.50		25,745.00		25,745.00
OPERATION LABOR	MONTHLY	104.04	3,084.30	1,238.39			4,428.73		4,428.73
	YTD	1,220.95	31,969.34	13,131.52			46,321.81		46,321.81
MAINTENANCE LABOR	MONTHLY	78.03	385.56	2,730.00			3,193.59		3,193.59
	YTD	571.09	4,571.41	33,624.02			38,766.52		38,766.52
OTHER LABOR	MONTHLY	26.82	64.75	2,573.65	4,037.78		6,703.00		6,703.00
	YTD	295.28	907.28	35,282.60	37,911.44		74,396.60		74,396.60
TOTAL	MONTHLY	282.89	3,832.61	7,226.54	5,460.58		16,802.62		16,802.62
	YTD	2,753.69	40,315.53	89,030.77	53,129.94		185,229.93		185,229.93
BENEFITS	MONTHLY				10,183.63		10,183.63		10,183.63
	YTD				62,375.88		62,375.88		62,375.88
TOTAL PAYROLL COST	MONTHLY	282.89	3,832.61	7,226.54	15,644.21		26,986.25		26,986.25
	YTD	2,753.69	40,315.53	89,030.77	115,505.82		247,605.81		247,605.81
OTHER DIRECT COST:									
MAINTENANCE	MONTHLY	0.00	1,822.22	3,788.02			5,610.24		5,610.24
	YTD	245.56	5,759.37	22,908.31			28,913.24		28,913.24
CHEMICALS	MONTHLY		4,765.67				4,765.67		4,765.67
	YTD		60,951.80				60,951.80		60,951.80
POWER	MONTHLY	4,758.94	17,193.49	20,104.52			42,056.95		42,056.95
	YTD	37,147.78	125,091.23	118,138.71			280,377.72		280,377.72
MISCELLANEOUS	MONTHLY	59.50	362.41	-1,107.63	1,512.28		826.36		826.36
	YTD	1,021.41	10,058.67	-6,681.31	82,426.80		86,825.77		86,825.77
TOTAL	MONTHLY	4,818.44	24,143.79	22,784.71	1,512.28		53,259.22		53,259.22
	YTD	38,414.95	201,861.07	134,365.71	82,426.80		457,068.53		457,068.53

Figure 5. Level III report - summary of costs by function.

MONTHLY
ENDING: AUGUST 31, 1978

LEVEL III SUMMARY OF COST
FOR
KENTON COUNTY KENTUCKY

COST CATEGORY	FUNCTION:	ACQUISITION	TREATMENT	DELIVERY	SUPPORT SERVICES	INTEREST	TOTAL	TAXES	TOTAL WITH TAXES
TOTAL PAYROLL AND OTHER DIRECT COSTS	MONTHLY	5,101.33	27,976.40	30,011.25	17,156.49		80,245.47		80,245.47
	YTD	41,168.64	242,176.60	223,396.48	197,932.62		704,674.34		704,674.34
DEPRECIATION	MONTHLY	536.91	2,723.58	14,948.79	1,560.83		19,770.11		19,770.11
	YTD	4,832.19	24,512.22	134,539.11	14,047.47		177,930.99		177,930.99
TOTAL	MONTHLY	5,638.24	30,699.98	44,960.04	18,717.32		100,015.58		100,015.58
	YTD	46,000.83	266,688.82	357,935.59	211,980.09		882,605.33		882,605.33
INTEREST	MONTHLY					0.00	0.00		0.00
	YTD					229.33	229.33		229.33
TAXES	MONTHLY							0.00	0.00
	YTD							0.00	0.00
TOTAL	MONTHLY	5,638.24	30,699.98	44,960.04	18,717.32	0.00	100,015.58	0.00	100,015.58
	YTD	46,000.83	266,688.82	357,935.59	211,980.09	229.33	882,834.66	0.00	882,834.66

Figure 5. (continued)

c. Maintenance labor - Gross pay to personnel for maintaining the facilities identified with the functions of acquisition, treatment, or delivery.

d. Other labor - Gross pay to all persons not included in the three labor categories previously defined; for example, meter readers and secretarial help.

e. Benefits - Costs of employee benefits, such as contributions to social security taxes, pension plans, and health insurance.

Other direct costs comprise all nonlabor costs before depreciation, interest, and taxes. The following subcategories are included:

a. Maintenance - All nonlabor costs involved in maintaining facilities identified with acquisition, treatment, or delivery, including the cost of materials and all other nonlabor cost incidental to maintenance labor.

b. Chemicals - The cost of chemicals used in the treatment process.

c. Power - The cost of power or fuel used to pump or treat water, excluding the costs of lighting and heating.

e. Miscellaneous - All other direct nonlabor costs not included in one of the above subcategories.

Depreciation is an element of the cost of billed water; therefore, an annual depreciation base by cost center was determined and the system charges each cost center one-twelfth of the annual depreciation.

Interest and taxes include all interest charges and taxes required to operate and maintain the facilities. These costs are displayed as a type of cost center (column) and are summarized by account type (row).

Level II Report - Cost Comparison

The Level II report is shown in Figure 6. This report compares the actual costs incurred with two standards: the budgeted costs and the prior year costs. In the Level IV report, the actual costs of each function are reported in detail by cost center and general ledger cost description. These costs are then summarized by cost center function and standard cost category to produce the Level III report. In the Level II report, these costs are compared with predetermined standards.

In Figure 6 showing the comparison of actual to budgeted costs, six columns of numbers follow the budget categories. The first two columns show actual costs for the current period and year to date. The second two columns reflect the budget by year to date and annual amount. The budgeted year-to-date amount represents the annual budget prorated for the number of months expired. The fifth and sixth columns show the variance of actual

LAST ENTRY: AUGUST 31, 1978
RPT PERIOD: MONTHLY (4 WKS)
YTD START: JANUARY 1, 1978

COST COMPARISON REPORT
FOR
KENTON COUNTY KENTUCKY
(LEVEL II)

COMPARISON OF ACTUAL COST TO BUDGET CONT-D

BUDGET CATEGORIES ACCT #	ACCOUNT NAME	ACTUAL COSTS CURR PERIOD	ACTUAL COSTS YR TO DATE	BUDGETED COSTS YR TO DATE	BUDGETED COSTS ANNUAL AMT	VARIANCE YR TO DATE BALANCE	VARIANCE YR TO DATE PERCENT	
921-04	COMMUNICATIONS	65.79	512.47	375.00	500.00	-137.47	136.7	**
921-13	UTILITIES	63.23	578.62	600.00	800.00	21.38	96.5	
921-15	OFFICE SUPPLIES	2.39	76.26	150.00	200.00	73.74	50.8	
921-20	AUTO MAINTENANCE	5.00	88.70	150.00	400.00	61.30	59.1	
921-22	AUTO GAS & OIL	27.08	239.89	375.00	500.00	135.11	64.0	
921-28	DUES & SUBSCRIPTIONS		1,322.05	300.00	400.00	-1,022.05	440.7	**
921-29	TRAVEL	48.34	688.69	750.00	1,000.00	61.31	91.8	
921-50	OTHER EXPENSES		56.70	75.00	100.00	18.30	75.6	
923-00	PROFFSSIONAL FEES	175.00	7,010.33	7,500.00	10,000.00	489.67	93.5	
924-00	PROPERTY INSURANCE		12,039.00	10,500.00	14,000.00	-1,539.00	114.7	**
925-00	INJURIES & DAMAGES	-1,351.73	29,953.23	15,000.00	20,000.00	-14,953.23	199.7	**
926-00	EMPLOYEE PENSIONS & BENEFITS	8,047.40	43,994.77	45,000.00	60,000.00	1,005.23	97.8	
926-21	FICA	1,580.14	16,291.20	18,000.00	24,000.00	1,708.80	90.5	
928-00	REGULATORY COMM EXP		1,745.56	1,125.00	1,500.00	-620.56	155.2	**
930-23	COMMISSIONERS FEES		4,500.00	3,750.00	5,000.00	-750.00	120.0	**
930-50	OTHER EXPENSES		310.89	300.00	400.00	-10.89	103.6	**
932-39	MAINT OF BUILDING	29.20	748.91	375.00	500.00	-373.91	199.7	**
932-40	MAINT EQUIPMENT		887.53	750.00	1,000.00	-137.53	118.3	**
932-50	OTHER EXPENSES			75.00	100.00	75.00		
TOTAL ACTUAL COSTS TO BUDGET		82,591.32	726,443.72	720,000.00	960,000.00	-8,443.72	101.2	**
NON BUDGETED COSTS								
680-30	EQUIPMENT EXP CR (CR)	-2,261.50	-19,695.50					
680-31	OVERHEAD EXP CR (CR)	-450.54	-8,113.08					
905-51	INTEREST EXPENSE DEPOSIT GUARANTEE	210.10	1,949.29					
926-23	PAYROLL TAXES - CITY	556.09	2,089.91					
TOTAL		80,245.47	704,674.34	720,000.00	960,000.00	15,325.66	97.9	
DEPRECIATION		19,770.11	177,930.99					
TOTAL		100,015.58	882,605.33	720,000.00	960,000.00	-162,605.33	122.6	**
INTEREST			229.33					
TAXES								
TOTAL		100,015.58	882,834.66	720,000.00	960,000.00	-162,834.66	122.6	**

Figure 6. Level II report - cost comparison.

Reproduced from best available copy.

LAST ENTRY: AUGUST 31, 1978
RPT PERIOD: MONTHLY (4 WKS)
YTD START: JANUARY 1, 1978

COST COMPARISON REPORT
FOR
KENTON COUNTY KENTUCKY
(LEVEL II)

COMPARISON OF ACTUAL COST TO PRIOR YEAR CONT-D

COST CATEGORIES	ACTUAL COSTS 1978 YR TO DATE	ACTUAL COSTS 1977 YR TO DATE	VARIANCE YR TO DATE BALANCE	VARIANCE YR TO DATE PERCENT
CHEMICALS				
POWER	118,138.71			
MISCELLANEOUS	-6,681.31			
DEPRECIATION	134,539.11			
TOTAL COST OF DELIVERY	357,935.59			
SUPPORT SERVICES				
PAYROLL COSTS:				
MANAGEMENT & SUPRV	15,218.50			
OPERATION LABOR				
MAINTENANCE LABOR				
OTHER LABOR	37,911.44			
BENEFITS	62,375.88			
OTHER DIRECT COSTS:				
MAINTENANCE				
CHEMICALS				
POWER				
MISCELLANEOUS	92,476.80			
DEPRECIATION	14,047.47			
TOTAL COST OF SUPPORT SERVICES	211,980.09			
TOTAL COST OF OPERATING	682,605.33			
INTEREST	229.33			
TAXES				
TOTAL COST OF ALL ITEMS	682,834.66			

Figure 6. (continued)

cost to budgeted cost as a balance and as a percent.

In the comparison of actual costs to budget, the rows of costs coincide with the general ledger chart of accounts because the utility normally establishes its budget by general ledger account. The total actual cost, budget, and variance are displayed only for budgeted accounts. Costs incurred for nonbudgeted general ledger accounts are printed below and the total balance is provided. Then budget and variances are given for depreciation, interest, and taxes, and a final total balance is provided. The second section of the Level II output, also shown in Figure 6, compares current year-to-date costs with previous year-to-date costs. The rows represent the standard cost categories used in the Level III output, because they constitute a standard reference for use in this comparison. The comparison is made for each of the six major cost functions, showing variance as a balance and as a percent. This information is followed by the total current year-to-date cost, prior year-to-date cost, and variance.

Level I Report - Summary of Systems Information

The Level I standard report illustrated in Figure 7 contains summary information from the accumulated cost data plus additional data intended to supply information by which to evaluate the overall operation of the utility. From the matrix format, a correlation can be made between costs and operations. The columns represent the six major cost center functions plus a subtotal before taxes and a final total after taxes.

The first five rows of Figure 7 contain cost data expressed as $/MG of RPW for the following: 1) current period, current year; 2) previous period, current year; 3) current period, previous year; 4) year to date, current year; and 5) year to date, previous year. These unit costs are compared in this way to facilitate a trend analysis.

The next two rows contain the total costs for the current period and year to date. These totals agree with the totals of the Level III and Level II reports by function and grand total. From the Level II report, the total budget variance is then printed as a percent of actual expenditure compared to the budget.

The next four rows contain data on water flow as follows: 1) treated water, current period; 2) RPW, current period; 3) RPW, year to date; and 4) RPW, previous year to date.

Treated water is the water coming from the treatment facility or source, which is available to the delivery function. Revenue-producing water (RPW) is the amount of water from which revenue was derived. The difference between treated water and RPW is water that was provided to users at no cost or which was lost in some way.

Finally, the Level I report gives the percentage of total cost chargeable to each function for the current year to date and the previous

DATE: AUGUST 31, 1978

SUMMARY OF SYSTEMS INFORMATION
FOR
KENTON COUNTY KENTUCKY
(LEVEL I)

CATEGORY	ACQUISITION	TREATMENT	DELIVERY	SUPPORT	INTEREST	TOTAL	TAXES	TOTAL
CURRENT PERIOD UNIT COST $/MG	21.46	116.88	171.18	71.26		380.78		380.78
PREVIOUS PERIOD UNIT COST $/MG	18.23	128.47	135.21	109.80	.10	392.61		392.61
CURRENT PERIOD PREVIOUS YEAR $/MG								
CURREAT YEAR (YTD) UNIT COST $/MG	21.43	124.26	166.77	98.77	.10	411.33		411.33
PREVIOUS YEAR (YTD) UNIT COST $/MG								
CURREAT PERIOD TETAL CUST	5638.24	30699.98	44960.04	18717.32		100015.58		100015.58
YEAR TO DATE TOTAL CUST	46000.63	266689.82	357935.59	211960.09	229.33	882834.66		882834.66
BUDGET VARIANCE YEAR TO DATE								101.20
TREATED WATER CURRENT PERIOD								286.10
REVENUE PRODUCING WATER CURRENT PERICD								262.64
REVENUE PRODUCING WATER (YTD)								2146.15
REVENUE PRODUCING WATER PREVIOUS YTD								
% OF TOTAL YEAR TO DATE	5.210	30.210	40.540	24.010	.030			100.000
% OF PREVIOUS TOTAL (YTD)								100.000

Figure 7. Level I report - summary of systems information.

year to date. This provides an indication of shifts in cost and of trends in areas where expenses are increasing.

Water Supply Data Analysis Report

The water supply data analysis report illustrated in Figure 8 establishes the relationship between costs and delivered water. This report identifies the cost of the water as it moves from the source to a delivery point. Some reasons for variation in the cost of water delivery are as follows: 1) the customer is farther from the treatment plant, requiring more pumping and transmission cost; 2) a high population density distribution area has the advantage of reduced fixed unit costs of delivery; 3) transmission in some distribution areas is more efficient than in others; and 4) some components of a utility system are more expensive to operate and maintain than others.

The water supply data analysis report furnished for the current period and for the year to date is presented in terms of total costs and then as unit costs. The total costs by function are shown by individual zones. In the example based on the Kenton Water District's system, there are three cost zones. The water flows from the treatment facility to zone 1, where it is boosted by pump stations to zone 2, and from there it is boosted again to zone 3.

Transmission costs are defined as the costs of moving water from one cost zone to another. The transmission cost in zone 1 is calculated by identifying the cost of the transmission mains in the zone, and then multiplying this cost by the ratio of water used in zone 1 to the total of water entering zone 1. The balance of the transmission cost is applied to moving the water to zone 2, and is therefore added to the transmission cost identified with zone 2. Calculations similar to these are made to determine the transmission costs of zones 2 and 3.

Pumping costs in zones 1, 2, and 3 are calculated similarly to transmission costs. The total pumping cost in zone 3 consists of the cost of the pump stations located in zone 3 plus part of the pumping costs from zones 1 and 2.

Because there is no relationship between storage or distribution cost and the cost of water moving from one zone into another, storage and distribution costs apply only to the zone of location.

In summary, the cost analysis report deals with two types of water delivery costs:

a. Transferable costs - Costs transferred in increments from cost centers to cost zones based on the movement of RPW within the zones. Transferable costs under the delivery function are pumping and transmission.

LAST ENTRY: AUGUST 31, 1978
RPT PERIOD: MONTHLY (4 WKS)
YTD START: JANUARY 1, 1978

COST ANALYSIS REPORT
FOR
KENTON COUNTY KENTUCKY

PAGE: 1

ITEM DESCRIPTION	ZONE 1	ZONE 2	ZONE 3			ZONES 1..3	TOTALS
FUNCTION COSTS FOR PERIOD:							
ACQUISITION						5,638.24	5,638.24
TREATMENT						30,699.98	30,699.98
DELIVERY							
TRANSMISSION	21.74	1,396.61	1,982.03				3,400.38
DISTRIBUTION	450.54	13,778.40	1,766.45				15,995.39
STORAGE	192.92	646.25	323.61				1,162.78
PUMPING	157.39	10,125.64	14,118.46				24,401.49
SUPPORT SERVICES						18,717.32	18,717.32
INTEREST							
TAXES							
TOTAL	822.59	25,946.90	18,190.55			55,055.54	100,015.58
TOTAL COSTS BY ZONE:							
DIRECT	822.59	25,946.90	18,190.55				44,960.04
INDIRECT	2,952.93	29,132.32	22,970.29				55,055.54
TOTAL	3,775.52	55,079.22	41,160.84				100,015.58
REVENUE PRODUCING WATER (MG)	14.09	138.98	109.58				262.64
	5.4%	52.9%	41.7%				100.0%
UNIT COSTS BY ZONE:							
ACQUISITION	21.47	21.47	21.47				21.47
	8.0%	5.4%	5.7%				5.6%
TREATMENT	116.89	116.89	116.89				116.89
	43.6%	29.5%	31.1%				30.7%
DELIVERY							
TRANSMISSION	1.54	10.05	18.09				12.95
	.6%	2.5%	4.8%				3.4%
DISTRIBUTION	31.97	99.14	16.12				60.90
	11.9%	25.0%	4.3%				16.0%
STORAGE	13.69	4.65	2.95				4.43
	5.1%	1.2%	.8%				1.2%
PUMPING	11.17	72.86	128.84				92.91
	4.2%	18.4%	34.3%				24.4%
SUB TOTAL	196.73	325.06	304.36				309.55
	73.4%	82.2%	81.0%				81.3%
SUPPORT SERVICES	71.26	71.26	71.26				71.26
	26.6%	18.0%	19.0%				18.7%
INTEREST							
	%	%	%				%
SUB TOTAL	267.99	396.32	375.62				380.81
	100.0%	100.0%	100.0%				100.0%
TAXES							
	%	%	%				%
TOTAL	267.99	396.32	375.62				380.81
	100.0%	100.0%	100.0%				100.0%

Figure 8. Water supply data analysis report.

LAST ENTRY: AUGUST 31, 1978
RPT PERIOD: MONTHLY (4 WKS)
YTD START: JANUARY 1, 1978

COST ANALYSIS REPORT
FOR
KENTON COUNTY KENTUCKY

ITEM DESCRIPTION	ZONE 1	ZONE 2	ZONE 3	.....	.....	ZONES 1..3	TOTALS
FUNCTION COSTS YEAR TO DATE:							
ACQUISITION						46,000.83	46,000.83
TREATMENT						266,680.82	266,680.82
DELIVERY							28,517.49
TRANSMISSION	126.91	12,174.42	16,216.16				158,720.52
DISTRIBUTION	4,250.44	138,191.95	16,318.13				12,802.44
STORAGE	2,572.50	7,549.25	2,680.69				157,895.14
PUMPING	927.35	74,568.83	82,398.96			211,980.04	211,980.09
SUPPORT SERVICES						229.33	229.33
INTEREST							
TAXES						524,899.07	882,834.66
TOTAL	7,877.20	232,444.45	117,613.94				
TOTAL COSTS BY ZONE:							357,935.59
DIRECT	7,877.20	232,444.45	117,613.94				524,899.07
INDIRECT	19,739.28	13,621.96	491,537.83				882,834.66
TOTAL	27,616.48	246,066.41	609,151.77				
REVENUE PRODUCING WATER (MG)	60.71	1,198.77	866.67				2,146.16
	1.8%	55.9%	40.4%				100.0%
UNIT COSTS BY ZONE:							
ACQUISITION	21.43	21.43	21.43				21.43
	6.3%	4.9%	5.6%				5.2%
TREATMENT	124.26	124.26	124.26				124.26
	36.3%	28.3%	32.7%				30.2%
DELIVERY							13.29
TRANSMISSION	1.57	10.16	18.71				3.2%
	.5%	2.3%	4.9%				75.96
DISTRIBUTION	52.66	115.24	18.83				18.0%
	15.4%	26.3%	5.0%				5.97
STORAGE	31.87	6.30	3.09				1.5%
	9.3%	1.4%	.8%				75.57
PUMPING	11.49	62.20	95.07				17.9%
	3.4%	14.2%	25.0%				312.48
SUB TOTAL	243.28	339.59	281.39				76.0%
	71.1%	77.4%	74.0%				98.77
SUPPORT SERVICES	98.77	98.77	98.77				24.0%
	28.9%	22.5%	26.0%				.11
INTEREST	.11	.11	.11				%
	%	%	%				411.36
SUB TOTAL	342.16	438.47	380.27				100.0%
	100.0%	100.0%	100.0%				
TAXES	%	%	%				%
	342.16	438.47	380.27				411.36
TOTAL	100.0%	100.0%	100.0%				100.0%

Figure 8. (continued)

b. Nontransferable costs - Costs of storing and delivering water within a single zone. Nontransferable costs are distribution and storage and apply only to the zone of interest.

As demonstrated in Figure 8, the total costs by zone are displayed as total direct and total indirect costs, and the total RPW delivered in each zone is shown as mil gal and as a percent of all water delivered.

The water supply data analysis report presents the unit cost of water by zone and function as follows:

a. Unit cost of water in a zone - Based on cost allocated from other zones (the transferable costs) and the nontransferable costs in each pressure zone. The total unit costs by zone do not sum to the unit cost of water for the entire system because the unit cost of the system is a weighted average of the unit costs of each zone.

b. Unit cost of water by function for each zone and for the entire system - Adding the unit costs by function within a zone gives the total unit cost for the zone but not for the system. Only when these zoned unit costs are multiplied by the RPW billed within the respective zones and summed will they yield the total cost for the system.

Examination of this report (unit cost by zone) will show trends or deviations from normal costs within a distribution area. Studying the functional unit costs by zone, the percentage of cost for acquisition, treatment, delivery, etc., will reveal fluctuations in transferable costs.

Figure 9 is a graphic presentation of the year-to-date cost of revenue-producing water from each zone in the Kenton Water District system, for the period ending August 1978. As can be seen in the graph, the cost of water for zone 2 is greater than zone 1 or zone 3. A closer detailed analysis of zone 2 reveals that zone 2 is more capital and service intensive therefore the greatest cost area in the utility's system.

CONCEPT OF THE COST CLASSIFICATION SYSTEM

The cost classification system illustrated in Figure 10 provides the interface with the financial reporting system and the parallel functioning of the cost analysis system. The first group of numbers (XXX-XX) designates the general ledger expense accounts. This five-digit number conforms in general to the National Association of Regulatory Utility Commissioners (NARUC) Chart of Accounts.[6]

The second group of numbers (YYYY) identifies the cost centers that generate the expense. As shown in Figure 10, the first digit of the cost center number identifies the function, the second digit identifies the subfunction, and the last two digits identify the unit. The subfunction (second digit) and identification (third and fourth digits) appear only in the Level IV report.

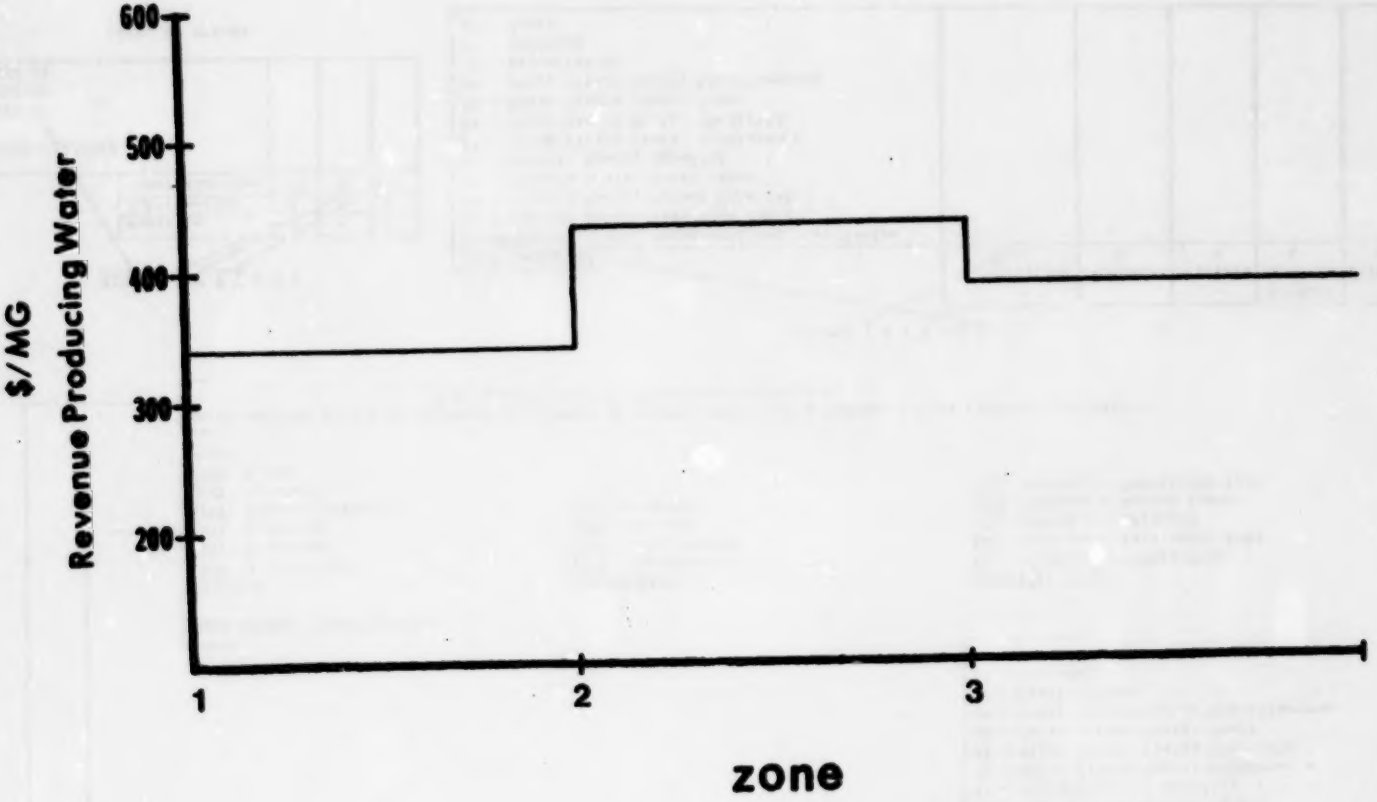


Figure 9. August 1978 year-to-date cost of water production by pressure zone in the Kenton Water District Delivery System.

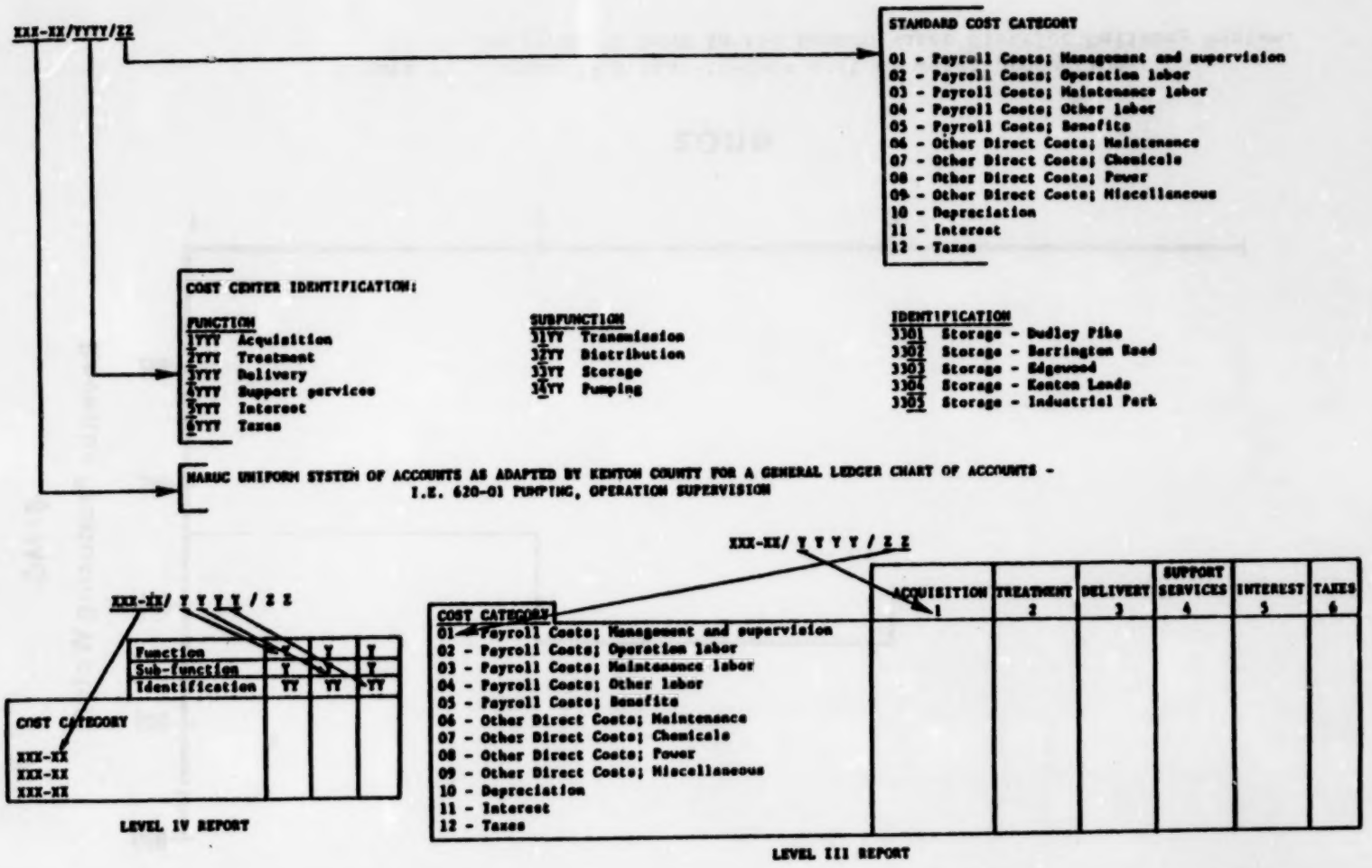


Figure 10. Cost classification system.

The lower left-hand portion of Figure 10 illustrates the function of the first two groups of numbers in producing the Level IV report, detailing all costs by general ledger accounts description and cost center. The rows represent the general ledger accounts; the columns identify the three levels of cost centers.

The third group of numbers (ZZ) as illustrated in the upper and lower right-hand portions of Figure 10, is a two-digit series corresponding to the 12 standard cost categories used in the Level III summary reports as illustrated in the upper and lower right-hand portions of Figure 10. Numbers from 01 through 04 represent labor sources and 05 through 12 represent nonlabor sources. Every O&M ledger account is assigned a standard cost category for both labor and nonlabor sources. For example, account number 624-16, lubricants, would not normally appear on a time card; however, if it should appear, it would automatically be assigned to cost category 04, payroll costs/other labor. The chart in the lower right-hand portion of Figure 10 illustrates how the four-digit cost center numbering system is used with the standard cost category numbering system to produce the Level III report by matching cost categories with the functions of acquisition, treatment, delivery, support services, interest, and taxes.

COST ALLOCATION CONCEPT

The cost analysis system accumulates costs of water production at various cost centers located within the physical utility system. Costs are assigned to the specific cost centers as the costs are recorded and allocated when specific cost centers are not known. The cost analysis system can only fulfill its function when all cost data are charged to the appropriate cost centers. This is accomplished by identifying the correct cost center when the data are entered on the source document; i.e., payroll time card, requisition from stock form, etc. Exceptions to this procedure will occur when the cost center information is not obtained or when a general cost is involved that cannot be identified to a specific center. To deal with such exceptions, an allocation concept assigns costs to appropriate cost centers.

Four basic methods of allocating costs to cost centers are defined and described below:

a. Cost Allocation Code A - Using Code A, all costs charged to a particular general ledger account but lacking cost center identification will always be charged to a single predesignated cost center. For example, costs charged to 600-01, Source of Supply/Operation Supervision, will always be charged to cost center 1101, Kenton County/Licking River Intake. Moreover, this Code A program will cancel an incorrect cost center shown on a source document and will automatically charge the correct cost center. This cost allocation will prevent errors resulting from incorrect cost center designations by charging the only acceptable cost center assigned to account 600-01.

b. Cost Allocation Code B - Under Code B, all indirect costs will be allocated to cost centers based on the ratio of direct costs charged to the cost centers from source documents. For example, each cost zone in Kenton County has a transmission cost center: 3101 for zone 1, 3102 for zone 2, and 3103 for zone 3. If 80 percent of all direct transmission costs of operation, maintenance, and depreciation is charged to 3102, then 80 percent of all indirect costs such as the supervisor's salary will also be charged to 3102.

c. Cost Allocation Code C - This code will allocate cost to designated cost centers based on a fixed multiplier. The code is used only once in the Kenton Water District cost analysis system for power costs charged to 623-06, power purchased treatment. In the Kenton Water District, 96.8 percent of the total power costs will be charged to cost center 3401, pump station/plant; the remainder will be charged to 2101, treatment/purification, to operate the water treatment pump and equipment. Because only one meter records all power used at the treatment plant, this allocation is based on a study made over a period of time to determine the amperage used to operate the delivery pumps at the treatment plant compared with the total amperage metered for the treatment plant during that period of time.

d. Cost Allocation Code D - This code is similar to Code A except that the direct costs shown on the source document will be recognized by the system and will override the single cost center programmed previously. Code D is used when there is no absolute connection between the ledger cost account and any single cost center.

Thus, general ledger cost accounts data are assigned specific information by the allocation process as follows:

a. The cost centers to be charged in the event direct charges are not made when data are entered.

b. The allocation code indicating the method to be used in allocating the cost.

c. The standard cost category to be charged is determined by the data source; i.e., labor or nonlabor.

A list of the Kenton Water District general ledger accounts by category and description is presented numerically by account number in Appendix B. This listing also shows the allocation code used and the cost centers assigned to each account.

As new general ledger accounts are created, it is imperative that they be assigned corresponding cost centers, an allocation code, and standard cost categories (labor and nonlabor). Unless a ledger account is identified with the information as specified above, costs assigned to it will not be processed by the cost analysis system.

CONCEPT OF INTERFACE WITH FINANCIAL REPORTING SYSTEM

The interface effort started with visits and briefings at Kenton County Water District No. 1 to study and develop an in-depth understanding of the operations, documentation methods, and accounting system. The effort was then directed to the task of interfacing the cost analysis system with the general ledger accounting/financial reporting system in use. The interface was designed to make maximum use of the existing input system to produce the desired accounting documentation and operational cost information. The required interface included computer programming to adjust the input data for generating the desired outputs.

After the interface was developed, the physical implementation was accomplished, including installation and verification that the computerized portion of the system was operational, making necessary revisions to the type and flow of information, and training utility personnel in the documentation requirements.

In simplified terms, the basic accounting system now in use at the Kenton Water District comprises two subsystems: 1) the cost analysis system developed by this effort, and 2) the general ledger/ financial reporting system already in operation at the utility. The cost analysis system is automated, but only the billing and accounts receivable portion of the general ledger/financial reporting system is automated.

Figure 11 illustrates the interface of the cost analysis system with the general ledger/financial reporting system used at the Kenton Water District.

Financial and operational data are shown flowing into the subsystems to produce the outputs shown. The general ledger input data are derived from source documents and also from the output of the cost analysis and accounts receivable subsystems.

All O&M transactions are processed through the cost analysis system. The cost analysis system receives operational and cost data from input documents prepared by Kenton Water District personnel and produces three types of reports. One type of report displays information that measures the performance of the utility, a second type provides a cost analysis report, and additional reports produce supplemental general ledger data that provide an audit trail and summarize the cost data for manual entry into the general ledger.

Appendix A is a list of the four-digit cost centers presently in use in the Kenton County-Covington systems, along with the two-digit numbering system used by Kenton County field personnel.

To eliminate any difficulty in recording the four-digit cost center number, the system was developed to accept the two-digit cost center numbers used by field personnel and automatically cross-reference them to the four-digit system of the cost analysis system. When a direct charge cannot be made because the cost center is unknown, the cost analysis system

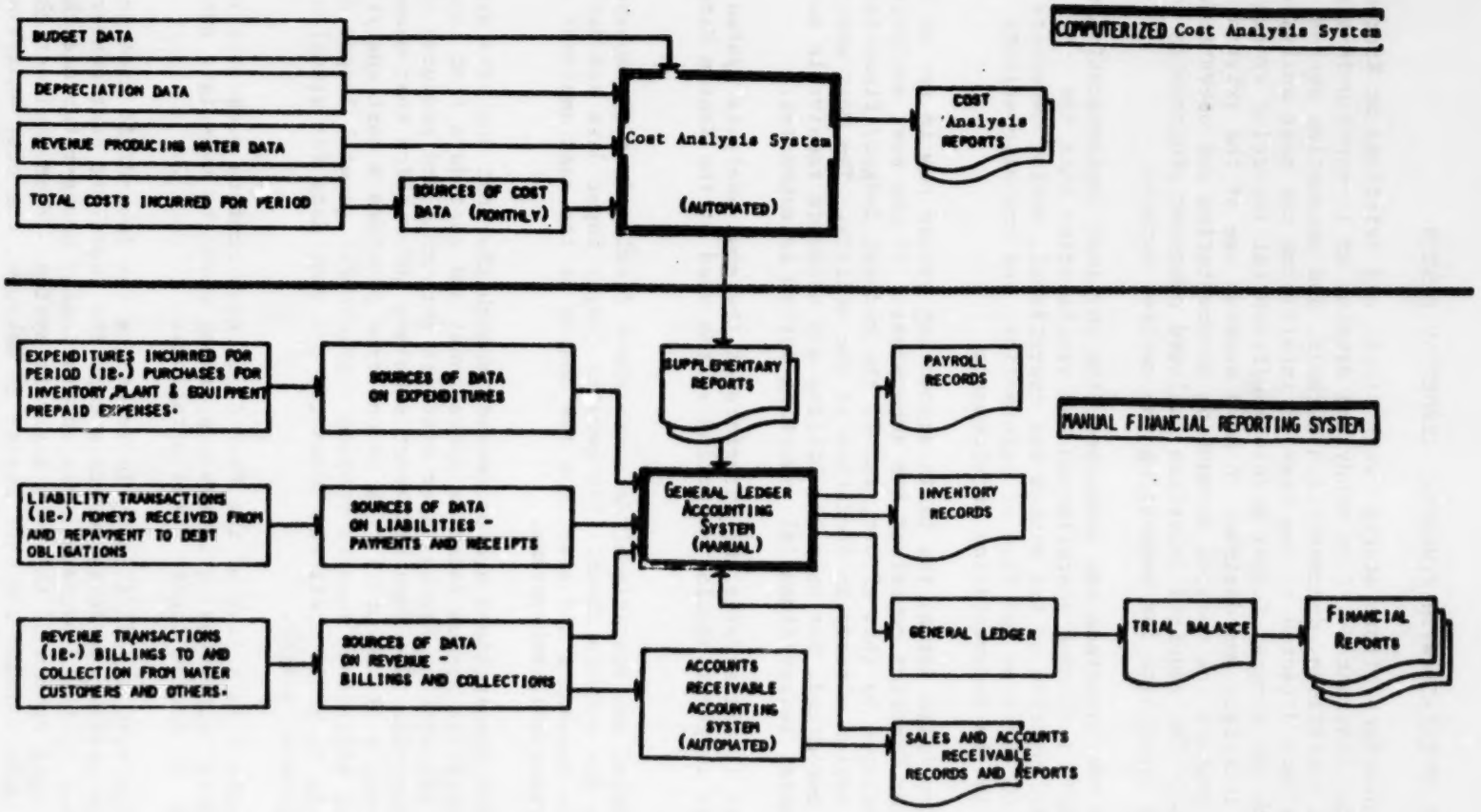

COMPUTERIZED Cost Analysis System
BUDGET DATA
DEPRECIATION DATA
REVENUE PRODUCING WATER DATA
TOTAL COSTS INCURRED FOR PERIOD
SOURCES OF COST DATA (MONTHLY)
Cost Analysis System
(AUTOMATED)
COST Analysis REPORTS
EXPENDITURES INCURRED FOR PERIOD (IE.) PURCHASES FOR INVENTORY, PLANT & EQUIPMENT PREPAID EXPENSES.
SOURCES OF DATA ON EXPENDITURES
SUPPLEMENTARY REPORTS
PAYROLL RECORDS
MANUAL FINANCIAL REPORTING SYSTEM
LIABILITY TRANSACTIONS (IE.) MONEYS RECEIVED FROM AND REPAYMENT TO DEBT OBLIGATIONS
SOURCES OF DATA ON LIABILITIES - PAYMENTS AND RECEIPTS
GENERAL LEDGER ACCOUNTING SYSTEM (MANUAL)
INVENTORY RECORDS
REVENUE TRANSACTIONS (IE.) BILLINGS TO AND COLLECTION FROM WATER CUSTOMERS AND OTHERS.
SOURCES OF DATA ON REVENUE - BILLINGS AND COLLECTIONS
ACCOUNTS RECEIVABLE ACCOUNTING SYSTEM (AUTOMATED)
GENERAL LEDGER
TRIAL BALANCE
FINANCIAL REPORTS
SALES AND ACCOUNTS RECEIVABLE RECORDS AND REPORTS

Figure 11. Interface of cost analysis system with financial reporting system.

will allocate the cost to an appropriate cost center through a cost allocation program. However, optimum usefulness of the system depends on accurate identification of costs to the correct cost centers.

SUPPLEMENTAL ACCOUNTING REPORTS

The supplemental reports have been developed to provide an interface with the financial reporting system of the Kenton Water District and serve the dual functions of providing an audit trail and summarizing data to post to the general ledger. Five reports are displayed in two configurations to fulfill these functions, and a general ledger summary report brings all this information together and completes this set of reports.

Payroll Report

The first function of the payroll report illustrated in Figure 12 lists the details of each payroll transaction by social security number to provide a balancing feature of each employee payroll expense. When more than one account is charged, the total will equal the total gross pay in the right-hand column.

The data are then sorted to list by general ledger account number the individual dollar amounts charged and the account total.

At the end of each month, this report is used to make journal entries, charging the general ledger accounts shown and crediting accrued payroll.

Requisition From Stock Report

The first function of this report, as illustrated in Figure 13, lists by requisition number the details of each transaction processed and serves as the audit trail. When more than one account is charged on a requisition, the amount charged to each account or cost center is shown, along with the total cost of the transaction. The data are then sorted to list, by general ledger account number, the amounts and the total charged to each account for stock requisitions for the month. The offsetting debits are charged to the appropriate accounts.

Payment Authorization Report

Figure 14 reports cost data from the payment authorization form used for all O&M purchases from outside vendors. The first configuration supplies, by form number, a detailed audit trail of transactions processed. The second page summarizes the amounts to be charged to each general ledger account for the purchases made for the month. The offsetting journal entry credit is to accounts payable. As checks are written to vendors, accounts payable is charged on the cash journal rather than the expense account.

Service Contract Report

This report summarizes the data from the service contract form as shown in Figure 15. Each service contract is listed by number, with the

DATE ENDING: AUGUST 31, 1978

PAYROLL REPORT
FOR
RENTON / COVINGTON KY

PAGE

EMPLOYEE NUMBER	DATE	ACCOUNT NUMBER		COST CENTER	TOTAL COST	GROSS PAY	TOTAL PAY	COMMENTS
294-16-9092	080378	660-10			224.00			
		926-30			56.00			
		926-21			16.94	280.00	296.94	
270-30-5233	080378	901-00			74.00			
		901-00	C		74.00			
		920-01			74.00			
		1101			74.00			
		1201			74.00			
		926-21			22.39	370.00	392.39	
487-07-9404	080378	920-01			311.45			
		920-01	C		207.70			
		926-21			31.41	519.25	550.66	
350-38-9746	080378	660-10			111.00			
		660-10	C		111.00			
		926-00			148.00			
		926-21			22.39	370.00	392.39	
400-42-0585	080378	926-00			148.00			
		660-01	C		74.00			
		660-01			74.00			
		1101			74.00			
		926-21			22.39	370.00	392.39	
403-34-7098	080378	926-00			74.00			
		926-00			74.00			
		1101			18.50			
		1201			18.50			
		600-01	C		18.50			
		610-01	C		18.50			
		620-01	C		18.50			
		620-01	C		18.50			
		630-01	C		18.50			
		640-01	C	72	74.00			
		650-01	C	72	18.50			
		926-21			22.39	370.00	392.39	
405-72-5256	080378	660-10	C		106.00			
		926-21			6.41	106.00	112.41	
403-08-6895	080378	660-10			95.40			
		643-03	C		10.60			
		926-21			6.41	106.00	112.41	
406-96-0342	080378	673-02	C	37	21.20			
		675-02	C	35	63.60			
		673-02	C	36	21.20			
		926-21			6.41	106.00	112.41	
405-62-1979	080378	660-10			95.40			
		643-03	C		10.60			
		926-21			6.41	106.00	112.41	
405-98-7155	080378	1102			84.80			
		926-21			5.13	84.80	89.93	
SUB TOTAL					2956.73	2788.85	2956.73	

Figure 12. Payroll report.

FINANCIAL COST ALLOCATION OF PAYROLL REPORT TRANSACTIONS

DATE: AUGUST 31, 1978 FOR PAGE: 1

KENTON / COVINGTON KY

ACCOUNT NUMBER	ACCOUNT NAME	AMOUNT	ACCOUNT TOTAL
1101	SUPERVISORY SERVICES	74.00	
		37.00	
		37.00	
		74.00	
		18.50	
		37.00	
		37.00	
			314.50
1102	MAINT EMERGENCY REPAIRS	17.48	
		3.24	
		29.00	
		4.86	
		9.18	
		41.20	
		41.20	
		22.40	
		124.83	
		2.92	
		84.80	
		146.00	
		192.00	
		4.50	
		266.00	
		4.95	
		39.80	
		95.94	
		48.00	
		45.66	
		53.20	
			1197.00
1201	OPER SUPERVISION	37.00	
		74.00	
		37.00	
		74.00	
		37.00	
		74.00	
		37.00	
		74.00	
		18.50	
			462.50
1202	OPERATION LABOR	32.20	
		28.98	
		36.80	
		32.20	
		32.20	

Figure 12. (continued)

DATE ENDING: AUGUST 31, 1978

REQUISITION FROM STOCK REPORT
FOR
KENTON / COVINGTON KY

PAGE

REQUISITION #	ACCOUNT #		COST CENTER	AMOUNT	TOTAL	COMMENTS
4058	9-1212			60.82	60.82	
4059	1213			152.05	152.05	
4060	676-53			299.70	299.70	
4061	1212			25.00	25.00	
4062	675-50			25.00	25.00	
4063	676-53			209.79	209.79	
4064	676-50			179.82	179.82	
4066	9-712			89.91	89.91	
4067	9-1212			30.41	30.41	
4068	9-712			29.97	29.97	
4070	676-50	C		29.97	29.97	
4071	676-53	C		59.94	59.94	
4072	675-50	C		15.03	15.03	
4073	675-53	C		15.03	15.03	
4074	676-50	C		59.94	59.94	
4075	675-50	C		30.06	30.06	
4077	676-50	C		29.97	29.97	
4078	675-50	C		30.06	30.06	
4079	676-50	C		59.94	59.94	
4080	9-712			239.76	239.76	
4081	9-712			29.97	29.97	
4082	676-50	C		132.00	132.00	
4084	676-53			149.85	149.85	
4085	9-712			220.20	220.20	
4488	1102			19.14		
	1102			41.51		
	1102			23.60		
	1102			22.96		
	1102			13.86		
	1102			25.24	140.31	
4489	1102			11.28		
	1102			35.75		
	1102			22.96		
	1102			20.79		
	1102			25.24	116.02	
4490	1102			68.90		
	1102			34.44		
	1102			37.86		
	1102			6.00		
	1102			20.79	167.99	
4491	1102			37.86		
	1102			34.44		
	1102			17.64		
	1102			20.79		
	1102			41.60	152.33	
SUB TOTAL				2780.84	2780.84	

Figure 13. Requisition from stock report.

DATE: AUGUST 31, 1978 FINANCIAL COST ALLOCATION OF REQUISITIONS FROM STOCK FOR KENTON / COVINGTON KY PAGE: 1

ACCOUNT NUMBER	ACCOUNT NAME	AMOUNT	ACCOUNT TOTAL
1102	MAINT EMERGENCY REPAIRS	25.24	
		11.26	
		34.44	
		67.45	
		37.86	
		20.79	
		35.75	
		53.30	
		13.86	
		22.96	
		22.96	
		11.76	
		20.79	
		25.24	
		25.24	
		68.90	
		34.44	
		37.86	
		6.00	
		20.79	
		37.86	
		34.44	
		17.64	
		20.79	
		41.60	
		13.14	
		17.64	
		37.86	
		59.05	
		20.79	
		34.44	
		46.00	
		20.79	
		37.86	
		41.51	
		23.60	
		34.44	
		17.64	
		12.62	
		5.88	
		22.96	
		6.93	
		34.44	
		13.86	
		6.50	
		17.64	
			1229.83
1212	MAINT OF SERVICES	25.00	
			25.00

Figure 13. (continued)

DATE ENDING: AUGUST 31, 1978

PAYMENT AUTHORIZATION REPORT
FOR
KENTON / COVINGTON KY

PAGE

PAYMENT AUTH. #	ACCOUNT #		COST CENTER	AMOUNT	TOTAL	COMMENTS
2190	1203-15			92.10		
	1219			138.15		
	676-50			60.00		
	66			-3814.20		
	903-24	C		1245.28		
	903-24			951.57		
	903-30			565.10		
	903-30	C		762.00		
2191	678-50	C		34.15		
	678-50			34.16		
	66			-68.31		
2192	66			-21.75		
	921-28			10.88		
	921-28	C		10.87		
2193	66			-65.00		
	923-60			32.50		
	923-60	C		32.50		
2194	66			-366.15		
	923-00			175.00		
	923-00	C		175.00		
	930-50			10.00		
	930-50	C		6.15		
2195	1203-5			209.46		
	66			-209.46		
2196	64			3055.16		
	66			-3055.16		
2197	66			-6774.50		
	92			2408.71		
	920-00			4365.79		
2198	66			-1998.29		
	90			1998.29		
2199	66			-617.37		
	902-20	C		617.37		
2200	66			-300.30		
	920-23	C		300.30		
2204	672-50	C	52	274.00		
	66			-274.00		
2205	652-50	C	72	1552.02		
	66			-1552.02		
2206	1102			6.75		
	66			-6.75		
2207	1102			2589.00		
	66			-2589.00		
2208	643-50		70	143.92		
	66			-143.92		

SUB TOTAL

Figure 14. Payment authorization report.

FINANCIAL COST ALLOCATION OF PAYMENT AUTHORIZATIONS

DATE: AUGUST 31, 1978 FOR PAGE: 1

KENTON / COVINGTON KY

ACCOUNT NUMBER	ACCOUNT NAME	AMOUNT	ACCOUNT TOTAL
1101	SUPERVISORY SERVICES	62.00 135.40 178.56	375.96
1102	MAINT EMERGENCY REPAIRS	277.87 1673.57 19.34 6.75 2589.00. 34.00	4600.53
111	CASH IN BANK CUST GUARANTEE ACCT	5993.77 -3313.77	2680.00
1203-18	OFFICE SUPPLIES & POSTAGE	92.10	92.10
1203-4	COMMUNICATION	360.44	360.44
1203-5	ELECTRICITY	5.25 209.46	214.71
1207	MAINT OF EQUIPMENT & USAGE	145.00	145.00
1209	WATER PURCHASED	2145.80	2145.80
1217	METER READING	92.80	92.80
1219	BILLING SERVICE EXPENSE	138.15	138.15
1220	PROFESSIONAL SERVICE	45.65	45.65
1226	TURN ON/OFF	-15.00	-15.00
15	ACCOUNTS RECEIVABLE CUSTOMERS	7.98 4.60 -4.80	

Figure 14. (continued)

DATE ENDING: AUGUST 31, 1978

SERVICE CONTRACT REPORT
FOR
KENTON / COVINGTON KY

	CONTRACT #	MATERIAL	LABOR	TRACTOR	COMPRESSOR	TRUCKS	OTHER	OVERHEAD	BALANCE	TOTAL	COMMENTS
	9046	-59.88	-67.14	-20.00		-13.00	-1.50	-16.15	-177.67	-177.67	
	9047	-59.88	-67.14	-20.00		-13.00	-1.50	-16.15	-177.67	-177.67	
	9048	-59.88	-67.14	-20.00		-13.00	-1.50	-16.15	-177.67	-177.67	
	9049	-59.88	-67.14	-20.00		-13.00	-1.50	-16.15	-177.67	-177.67	
	9050	-59.88	-67.14	-20.00		-13.00	-1.50	-16.15	-177.67	-177.67	
	9056	-76.32	-52.78	-20.00		-13.00	-1.50	-16.36	-179.96	-179.96	
	9059	-41.68	-33.57	-10.00		-6.50		-9.18	-100.93	-100.93	
	9060	-103.22	-100.71	-30.00	-12.00	-19.50	-5.50	-27.09	-298.02	-298.02	
	9061	-46.35	-67.14	-20.00		-13.00	-1.50	-14.80	-162.79	-162.79	
	9062	-47.63	-33.57	-10.00		-6.50	-1.50	-9.92	-109.12	-109.12	
	9063	-47.00	-67.14	-20.00		-13.00	-1.50	-14.86	-163.50	-163.50	
	9064	-47.00	-67.14	-20.00		-13.00	-1.50	-14.86	-163.50	-163.50	
	9067	-47.56	-67.14	-20.00		-13.00	-1.50	-14.92	-164.12	-164.12	
	9072	-268.02	-125.46	-60.00		-39.00	-1.50	-49.40	-543.38	-543.38	
	9073	-70.84	-100.71	-30.00	-12.00	-19.50	-5.50	-23.86	-262.41	-262.41	
	9077	-100.81	-100.71	-30.00	-6.00	-19.50	-5.50	-26.25	-288.77	-288.77	
	9078	-77.61	-67.14	-20.00		-13.00	-1.50	-17.93	-197.18	-197.18	
	9079	-100.81	-100.71	-30.00	-12.00	-19.50	-5.50	-26.85	-295.37	-295.37	
	9080	-100.81	-100.71	-30.00	-12.00	-19.50	-5.50	-26.85	-295.37	-295.37	
	9082	-46.80	-19.58	-10.00		-6.50	-1.50	-8.43	-92.81	-92.81	
	9083	-44.00	-15.11	-10.00		-6.50	-1.50	-7.71	-84.82	-84.82	
	9084	-63.34	-83.19	-30.00	-12.00	-7.50	-5.50	-20.15	-221.68	-221.68	
	9085	-50.22	-67.14	-20.00		-13.00	-1.50	-15.19	-167.05	-167.05	
	9086	-100.81	-100.71	-30.00	-12.00	-19.50	-5.50	-26.85	-295.37	-295.37	
	9097	-70.84	-100.71	-30.00	-12.00	-19.50	-5.50	-23.86	-262.41	-262.41	
	9100	-47.64	-67.14	-20.00		-13.00	-1.50	-14.93	-164.21	-164.21	
	9101	-104.15	-134.28	-40.00	-12.00	-26.00	-5.50	-32.19	-354.12	-354.12	
	9101	-6127.28	-5562.31	-1730.00	-282.00	-1173.50	-192.50	-1477.29	-16544.88	-16544.88	SUBTOTAL
C	8717	-91.71	-188.88			-52.00		-33.26	-365.85	-365.85	
C	9012	-76.00	-118.50	-60.00		-28.00	-1.50	-28.40	-312.40	-312.40	
C	9012	-167.71	-307.38	-66.00		-80.00	-1.50	-61.66	-678.25	-678.25	SUBTOTAL
C	9012	-6294.99	-5869.69	-1790.00	-282.00	-1253.50	-194.00	-1538.95	-17223.13	-17223.13	TOTAL

Figure 15. Service contract report.

FINANCIAL COST ALLOCATION OF SERVICE CONTRACT TRANSACTIONS

DATE: AUGUST 31, 1978 FOR PAGE: 1

KENTON / COVINGTON KY

ACCOUNT NUMBER		ACCOUNT NAME	AMOUNT	ACCOUNT TOTAL
660-30		EQUIPMENT EXP CR (CR)	-3378.00	-3378.00
660-30	C	EQUIPMENT EXP CR (CR)	-141.50	-141.50
660-31		OVERHEAD EXP CR (CR)	-1477.29	-1477.29
660-31	C	OVERHEAD EXP CR (CR)	-61.66	-61.66
DEBIT TOTAL			0.00	
CREDIT TOTAL			-5058.45	

Figure 15. (continued)

cost chargeable to each of seven categories, and the total is shown under the balance column. Totals of the columns headed TRACTOR, COMPRESSOR, TRUCK, and OTHER are processed by the cost analysis system as a credit to the equipment expense credit account, and the total of the overhead is processed as a credit to the overhead expense credit account. Journal entries are made to reflect these credits, and an offsetting debit is made to the construction in process/new services account. When the total of the MATERIAL column is entered as a credit to inventory with a debit to the contruction in process/new services account, this same information must not be posted from the requisition from stock report.

Miscellaneous Transactions Report

All cost transactions not processed from other source documents are entered through a miscellaneous transactions and adjustments form. The reports illustrated in Figure 16 provide an audit trail of the transactions entered and a summary of the ledger accounts with a net debit or credit for each account.

General Ledger Account Summary

Figure 17 represents the supplemental report summarizing, by general ledger account numbers, all the input data used in the five previous reports. This report balances to the other supplemental reports and can be used to post journal entries into the general ledger system.

DATE ENDING: AUGUST 31, 1978

MISCELLANEOUS TRANSACTIONS REPORT
FOR
KENTON / COVINGTON KY

ENTRY NUMBER	ACCOUNT NUMBER		COST CENTER	AMOUNT	CREDIT TOTAL	DEBIT TOTAL	COMMENT
999	1212			40.32			
	1212-50			20.37CR			
	17	C		4275.27CR			
	633-72	C		120.00CR			
	633-75	C		120.00			
	642-02	C		244.80			
	642-17	C		88.00CR			
	643-03	C		17.10			
	673-00			19.95CR			
	673-02			19.95			
	673-50	C		115.78			
	675-02			39.00CR			
	675-02	C		39.00			
	675-50			12.65			
	675-50	C		12.65CR			
	678-02			85.20CR			
	678-02	C		85.20			
	680-30			65.50			
	680-30	C		217.00CR			
	680-31			46.90			
	680-31	C		95.48CR			
	926-21			4165.72			

Figure 16. Miscellaneous transactions report.

FINANCIAL COST ALLOCATION OF MISCELLANEOUS TRANSACTIONS

DATE: JULY 31, 1978 FOR PAGE: 1

KENTON / COVINGTON KY

ACCOUNT NUMBER	ACCOUNT NAME	AMOUNT	ACCOUNT TOTAL
			0.00
DEBIT TOTAL		0.00	
CREDIT TOTAL		0.00	

Figure 16. (continued)

ACCOUNT NUMBER	AMOUNT
620-01	283.50
620-10	46.25
623-05	4758.94
623-06	17749.03
623-07	19548.98
624-02	1238.39
624-04	346.52
624-22	108.44
626-13	47.36
626-50	.53
630-01	37.00
633-52	78.03
633-65	328.78
633-74	36.72
633-75	72.32
640-01	259.00
640-10	64.75
641-00	4765.67
642-02	3086.30
642-04	74.71
642-13	62.20
642-17	87.20
642-20	15.80
643-03	101.50
643-25	21.00
650-01	37.00
651-02	91.80

ACCOUNT SUMMARY

Figure 17. General ledger account summary.

SECTION 3

COST ANALYSIS SYSTEM OPERATIONS

COST DATA FLOW THROUGH THE COST ANALYSIS SYSTEM

Cost data from five source documents are used in the Kenton Water District cost analysis system as illustrated in Figure 18. In addition to the forms previously used as source documents by the Kenton Water District, the payment authorization form was developed to provide a document for handling all purchases from outside vendors. The miscellaneous transactions or adjustments form was added because no convenient document existed for processing assorted miscellaneous transactions not appropriate to other input forms.

Although other accounting documents are in use by the Kenton Water District, they do not generate data for entry into the general ledger (for example, a work order system is used only for control). Labor and materials are charged directly from the source documents (payroll time cards, requisition forms, etc.) and are not entered through work orders in process.

Figure 18 describes the cost data bank compiled from source documents by the cost analysis system. Payroll costs, cost of materials used from stock, depreciation, purchases, and interest are added; the total is then increased or decreased by any necessary adjustments. At this point, two types of costs are removed from the data bank: 1) costs to be capitalized (for example, service contract expenses); and 2) costs recoverable by revenue entry, such as cost of materials sold and cost of maintenance services for other utilities. This removal of nonoperating and nonmaintenance costs results in isolating the cost incurred to produce and deliver water.

Following the flow of Figure 18, the cost data are listed as they appear in output format. Three basic types of cost reporting are generated for management information: 1) costs reported by various cost centers, useful for monitoring and measuring performance at the cost centers; 2) costs reported as cost of RPW, useful in identifying or adjusting the cost of RPW billed to customers; and 3) costs reported by performance to some standard, useful in measuring the current performance of the utility.

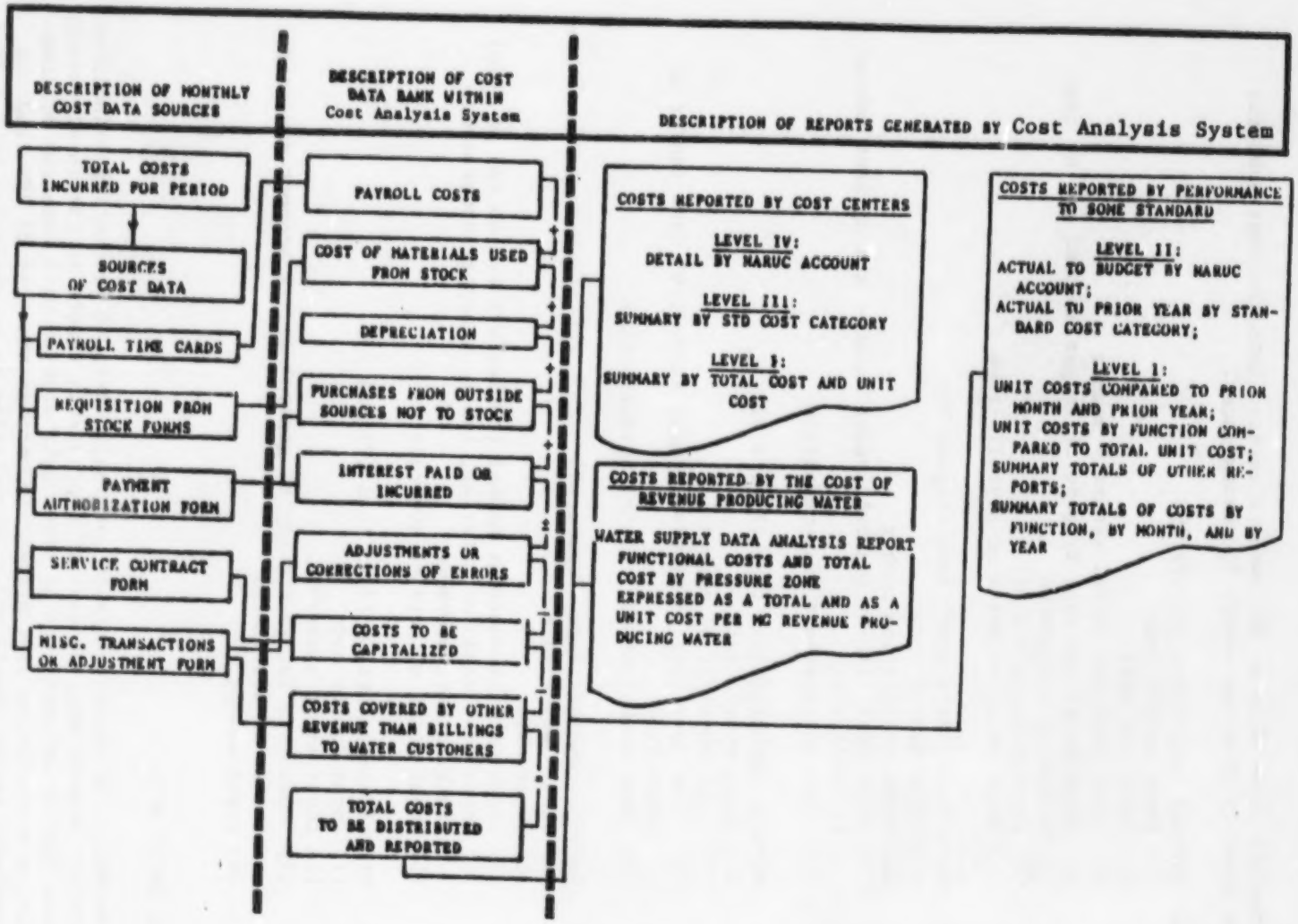

DESCRIPTION OF MONTHLY COST DATA SOURCES
DESCRIPTION OF COST DATA BANK WITHIN Cost Analysis System
DESCRIPTION OF REPORTS GENERATED BY Cost Analysis System
TOTAL COSTS INCURRED FOR PERIOD
SOURCES OF COST DATA
PAYROLL TIME CARDS
REQUISITION FROM STOCK FORMS
PAYMENT AUTHORIZATION FORM
SERVICE CONTRACT FORM
MISC. TRANSACTIONS OR ADJUSTMENT FORM
PAYROLL COSTS
COST OF MATERIALS USED FROM STOCK
DEPRECIATION
PURCHASES FROM OUTSIDE SOURCES NOT TO STOCK
INTEREST PAID OR INCURRED
ADJUSTMENTS OR CORRECTIONS OF ERRORS
COSTS TO BE CAPITALIZED
COSTS COVERED BY OTHER REVENUE THAN BILLINGS TO WATER CUSTOMERS
TOTAL COSTS TO BE DISTRIBUTED AND REPORTED
COSTS REPORTED BY COST CENTERS
LEVEL IV: DETAIL BY NARUC ACCOUNT
LEVEL III: SUMMARY BY STD COST CATEGORY
LEVEL II: SUMMARY BY TOTAL COST AND UNIT COST
COSTS REPORTED BY THE COST OF REVENUE PRODUCING WATER
WATER SUPPLY DATA ANALYSIS REPORT FUNCTIONAL COSTS AND TOTAL COST BY PRESSURE ZONE EXPRESSED AS A TOTAL AND AS A UNIT COST PER MG REVENUE PRODUCING WATER
COSTS REPORTED BY PERFORMANCE TO SOME STANDARD
LEVEL II: ACTUAL TO BUDGET BY NARUC ACCOUNT; ACTUAL TO PRIOR YEAR BY STANDARD COST CATEGORY;
LEVEL I: UNIT COSTS COMPARED TO PRIOR MONTH AND PRIOR YEAR; UNIT COSTS BY FUNCTION COMPARED TO TOTAL UNIT COST; SUMMARY TOTALS OF OTHER REPORTS; SUMMARY TOTALS OF COSTS BY FUNCTION, BY MONTH, AND BY YEAR

Figure 18. Cost data flow through the cost analysis system.

MONTHLY INPUT DATA

Monthly input data as follows are entered into the cost analysis system directly from the source documents named.

a. Payroll time cards (Figure 19)
   (1) Input source code
   (2) Input pay date
   (3) Input employee social security number
   (4) Input gross pay data by general ledger account and by cost center if designated
   (5) Input total gross pay
   (6) Input employer share of payroll taxes

b. Requisition from stock form (Figure 20)
   (1) Input source code
   (2) Input requisition number
   (3) Input cost data by general ledger account and by cost center if designated
   (4) Input total amount of requisition

c. Payment authorization form (Figure 21)
   (1) Input source code
   (2) Input requisition number
   (3) Input cost data by general ledger account by cost center if designated
   (4) Input amount of the payment authorization

d. Service contract form (Figure 22)
   (1) Input source code
   (2) Input date
   (3) Input service contract number (number written on top of form)
   (4) Input cost data for material, labor, tractor, compressor, truck, other, overhead
   (5) Input total of service contract

e. Miscellaneous transactions form (Figure 23)
   (1) Input source code
   (2) Input entry number
   (3) Input data for that entry by general ledger account and cost center if designated
   (4) Input amount

ANNUAL INPUT DATA

Normally, in accordance with generally accepted accounting principles for utility accounting, the cost of depreciable assets is recovered through the bond fund by arrangements to cover debt service with consumer billing. However, a depreciation cost element is part of the cost of RPW, and the cost analysis system should treat depreciation as an operating cost rather than a recoverable cost.

KENTON COUNTY WATER DISTRICT No. 1

WEEKLY TIME CARD

NAME _____ SOCIAL SEC. NO _____ RATE _____ WEEK ENDING _____

	JOB NO.	HRS.	RATE	COST		JOB NO.	HRS.	RATE	COST
FRI.					TUES.				
SAT.					WED.				
SUN.					THUR.				
MON.									

JOB NO.	TOTAL HRS.	TOTAL COST
REGULAR	OVERTIME	GROSS
W. H. TAX		
O. A. S.		
STATE TAX		
PENSION		
INSUR.		
TOTAL		
NET EARNINGS		

SIGN

Figure 19. Payroll input form.

№ 6134

KENTON COUNTY WATER DISTRICT No. 1

REQUISITION FROM STOCK

CHARGE TO

DATE

QUANTITY	STOCK NO.	DESCRIPTION	UNIT PRICE		TOTAL	

FILLED BY

RECEIVED BY

TOTAL

Figure 20. Requisition from stock input form.

KENTON COUNTY WATER DISTRICT NO. 1

PAYMENT AUTHORIZATION

№ 2134

DATE_____

VENDOR_____

FUND_____

AMOUNT $_____

Figure 21. Payment authorization input form.

Service No. _____

SERVICE CONTRACT FORM

Meter No. _____ Date Installed _____

Quantity	Size		Unit Cost		Total	
		Meter				
		Meter Vault				
		Meter Top				
		Corporation				
		Copper Setter				
		Yoke Complete				
		Copper Pipe				
				Total		

Hrs.	Labor	Cost		Total Material				
				State Tax				
				Labor				
				Hrs.	Tractor			
					Compressor			
					Service Truck			
					Dump Truck			
	Total						Sub-Total	
							Overhead	
							Total	

Date _____ Completed by _____

Figure 22. Service Contract input form.

KENTON COUNTY WATER DISTRICT #1

MISCELLANEOUS TRANSACTIONS OR ADJUSTMENTS
DATE
FOR ADDITIONAL COST ENTRIES OR ADJUSTMENTS OF PRIOR COSTS

ENTRY NO.	DESCRIPTION	GENERAL LEDGER ACCT NO.	COST CENTER NO.	AMOUNT TO BE DEBITED OR (CREDITED)	TOTAL DEBIT AND (CREDIT) EACH ENTRY

Because the Kenton Water District did not depreciate its fixed assets, it was necessary to research the records to establish a depreciation base. The depreciation base for Kenton Water District assets was established, using as reference a December 31, 1959 study made by O. G. Loomis and Son, Consulting Engineers. At that time, asset values were established and existing service lines were estimated.

All asset changes from 1959 to the present were reviewed by the asset classification used in the general ledger. Fixed assets of the distribution system were treated differently because contributions were made to the utility but were not necessarily recorded in the ledger accounts. A composite adjustment factor was computed to convert 1976 replacement costs to actual costs. To accomplish this adjustment, the 1976 replacement cost for asset additions at various times was computed using the Handy-Whitman Index of Water Utility Constructin Cost[7]. The resulting total book cost was compared with the totals of the calculated 1976 replacement costs for various distribution components to arrive at an adjustment factor.

Once this factor was calculated, it was applied to the current replacement cost of distribution assets in service (obtained from the Kenton Water District Engineering Department) to convert this value to cost (either actual or from contributions). This calculation was made for the following: mains 12 inches or more, mains and laterals less than 12 inches, valves and hydrants, and meters and services. Table 2 exemplifies a summary of the effort to calculate depreciation.

The method for entering depreciation is to use the depreciation entry form (Figure 24), listing the cost center and its annual depreciation. Once this is done and entered into the system, the system will charge that cost center with one-twelfth of the annual amount for each monthly run. If depreciation does not change for a particular cost center, it is not necessary to make an adjusting entry. However, once an adjusting entry is made, the annual depreciation entered will reflect the depreciation change for that cost center.

The accuracy of depreciation cost elements depends on current depreciation information reflecting additions and retirements of assets as they occur. Therefore, depreciation data should be reviewed and adjusted at least annually.

SYSTEM MAINTENANCE

Changes, additions, or deletions must be handled according to specific procedures to ensure the proper functioning of the cost analysis system.

New General Ledger Accounts

Initiating a new general ledger account that will accumulate cost in the cost analysis system requires the following input: 1) new account number, 2) assigned cost center numbers, 3) applicable allocation code, and 4) standard cost categories (labor and nonlabor).

TABLE 2. DEPRECIATION SUMMARY

KENTON COUNTY, KENTUCKY, WATER DISTRICT NO. 1
DEPRECIATION SUMMARY - 1977/1978

Asset Classification	Office & warehouse building	Residence at plant	Office Equipment	Vehicles	Storage facilities	Pump stations	Treatment plant and equipment	Mains and laterals	Valves, hydrants	Meters, services	Totals
Cost Center											
1101 Licking River Intake											
1201 River Intake											
1301 River Intake						6443.00					6443.00
2101 Water Purification											
2201 Plant Overhead							32683.00				32683.00
3101 First Pressure Zone								2502.00			2502.00
3102 Second Pressure Zone								12892.00			12892.00
3103 Third Pressure Zone								5325.00			5325.00
3201 First Pressure Zone								372.00	1580.00	2124.00	4076.00
3202 Second Pressure Zone								37116.00	29531.00	36989.00	103636.00
3203 Third Pressure Zone								3809.00	5502.00	6757.00	16068.00
3301 Dudley Pike					2040.00						2040.00
3302 Barrington Road					2551.00						2551.00
3303 Edgewood					2290.00						2290.00
3304 Kenton Lands					2040.00						2040.00
3305 Industrial Park					2290.00						2290.00
3401 Plant						11626.00					11626.00
3402 Dixie Highway						519.00					519.00
3403 Kyles Lane						1068.00					1068.00
3404 Dudley Pike						6620.00					6620.00
3405 Turkey Foot						2135.00					2135.00
3406 Lafayette						1708.00					1708.00
4101 Customer Accounts											
**			*	*							
4201 Adm.& General	3298.00	305.00	4803.00	10324.00							18730.00
Totals	3298.00	305.00	4803.00	10324.00	11211.00	30119.00	32683.00	62016.00	36613.00	45870.00	237242.00

* Includes Covington's Office Equipment ($8125.00) and Vehicles ($17392.00) acquired by Kenton County.
** Divided by 2 - both Kenton County and Covington share equally in the depreciation.

KENTON COUNTY WATER DISTRICT #1

DEPRECIATION ENTRY FORM

COST CENTER NO.	ANNUAL DEPRECIATION

New Cost Center Numbers

The effect of a new cost center on the allocation codes must be determined and any necessary adjustments must be made.

Information about the location and function/subfunction of the cost center will be necessary to determine accumulation of costs.

Changes to Permanent Files

Any addition, deletion, or change to a permanent file, including budget information, must be entered into the operating system to provide accurate up-to-date output reports.

COMPUTER OPERATIONS

Volume I describes the development and operation of the cost analysis system. Volume II contains the programming documentation and operating instructions for the cost analysis system.

SECTION 4

SUMMARY AND CONCLUSIONS

Kenton County, Kentucky, Water District No. 1 data has been processed by a cost analysis system since January 1, 1978. Overall, the performance of the cost analysis system has been impressive. In addition to providing useful management reports, the cost analysis system has assisted in improving the existing Kenton County Water District financial reporting system.

The following three problems have been encountered with the Water District CAS system:

1. Some data entered into the manual financial reporting system were not concurrently entered into the cost analysis system. This has led to an imbalance between the two systems, and required adjustments.

2. Depreciation has been a problem within the system since Kenton County's fixed asset records were not established with the capability of identifying the proper depreciation. This necessitated the allocation of depreciated values. Depreciation is now included as a routine item in all reports.

3. The cost analysis system requires input data documented to the level of cost centers. To make an account or cost center change, additional information for the computer operation must be developed. As stated earlier, this system requires that each cost be identified by a number that denotes the area where services are being performed. This is necessary in order to identify the cost to the actual cost center. Some difficulty has been encountered in having source documents coded with the proper cost centers. However, the cost analysis program will allocate those costs to cost centers even though they are not included on a source document. When this system is utilized as a management tool, a better understanding of its operation will be developed and the accuracy of identifying activities to cost centers will improve.

During its operation, the system has accomplished the following:

1. A cost analysis system for analyzing water supply data has been developed which does have features making it applicable to other water supply utilities. This system has been implemented and operated at Kenton County Water District No. 1.

2. The system, using a matrix concept, can match operational and financial data at the top level functions of acquisition, treatment, delivery, and support services, and for two lower levels of detail.

3. This system allows a water utility manager to evaluate cost of the total utility down to the smallest component of the system. The costs are logically structured so he can move from one level to another with compatible data.

4. This system can be used to estimate the cost of water as it flows through the actual utility system and is delivered to the various consumers.

5. The reports generated by the system can be used to compare budgeted versus actual expenditures as well as a cost comparison between specific operations for different time periods, such as this year's electrical cost versus the cost of electricity for last year. After several years of information is accumulated, these features should significantly improve the capability for long-range forecasting.

6. The data base developed contains the same types of information that would be used as a base for a financial reporting system. This base, with the addition of other information such as revenues, can form a financial reporting system.

7. The system is capable of generating special, useful reports, such as payroll summaries; requisition from stock reports; payment authorization report; service contract report, etc.

After much of the development work was completed on the cost analysis system for the Kenton County Kentucky, Water District No. 1, the organization acquired the responsibility for the Covington, Kentucky Water System, and the two systems became integrated. However, because of issues relating to various bonds that were outstanding, it was decided to keep the Covington and Kenton systems separate from a cost analysis standpoint. Program adjustments were made and separate cost analysis reports are produced for the Covington utility. This proved that the cost analysis system could be applied to a separate utility without major reprogramming.

The cost analysis system for the two separate utilities provided the utility director with a comparison of costs. During a comparison, it was discovered that one of the treatment plants was producing water at a lower cost than the other treatment plant. Since the two systems were physically connected, the Director began to utilize the more efficient plant for the majority of the water production.

Cost analysis system reports are provided monthly allowing management, from the Commissioner level down, to review costs shortly after they have occurred. Therefore, management action can be taken when cost occur rather than later, when a major impact on the organization has taken place.

The development of a cost analysis system based on its application in Kenton County has been successful. The managers have used it to make critical decisions regarding the utility system and have made it a routine part of their operations. They intend to use it as the basis for accounting and financial reporting in the future.

It is the authors' opinion that the system, with proper adaptation, can be applied easily to other utilities. However, additional work might have to be done to adapt the system to a larger water utility and/or to other utility functions such as wastewater management.

REFERENCES

1. U.S., Congress, Senate. 1974. Safe Drinking Water Act. Public Law 93-523.

2. Gillean, James I., W. Kyle Adams, and Robert M. Clark. 1977. The Cost of Water Supply and Water Utility Management. Volume II. Municipal Environmental Research Laboratory, Office of Research and Development, U.S. EPA, Cincinnati, OH.

3. Clark, Robert M., James I. Gillean, and W. Kyle Adams. 1977. The Cost of Water Supply and Water Utility Management. Volume I. Municipal Environmental Research Laboratory, Office of Research and Development, U.S. EPA, Cincinnati, OH.

4. National Committee on Governmental Accounting. 1978. Governmental Accounting, Auditing, and Financial Reporting. Municipal Finance Officers Association of the United States and Canada. Chicago, Ill.

5. Davis, Gordon B., CPA, PhD. 1975. Auditing & EDP. American Institute of Certified Public Accountants, Inc. New York, N.Y.

6. National Association of Regulatory Utility Commissioners. 1977. National Association of Regulatory Utility Commissioners - Uniform System of Accounts for Water Utilities. Washington, D.C.

7. Whitman, Requardt, and Associates. 1973. Handy-Whitman Index of Water Utility Construction Cost. Baltimore, MD.

APPENDIX A

KENTON WATER DISTRICT-COVINGTON
COST CENTER IDENTIFICATIONS

PUMP STATIONS	COST CENTER NUMBERS	KENTON COUNTY NUMBERS
Kenton County		
River intake	1301	01
Plant	3401	02
Dixie Highway	3402	03
Kyles Lane	3403	04
Dudley Pike	3404	05
Turkey Foot	3405	06
Lafayette	3406	07
Covington		
River intake	1320	11
Cold Spring	3422	12
Ida Spence	3423	13
Devoe Park	3424	14
Boone County	3425	15
TRANSMISSION (mains 12 inches or more)		
Kenton County		
River intake	1201	20
Zone 1 (first pressure zone)	3101	21
Zone 2 (second pressure zone)	3102	22
Zone 3 (third pressure zone)	3103	23
Covington		
River intake	1220	24
Zone 5 (basin area)	3121	25
Zone 6 (Ida Spence)	3122	26

KENTON WATER DISTRICT-COVINGTON
COST CENTER IDENTIFICATIONS (continued)

Covington (continued)	COST CENTER NUMBERS	KENTON COUNTY NUMBERS
Zone 7 (Devoe Park)	3123	27
Zone 8 (Boone County)	3124	28
Zone 9 (Cold Spring)	3125	— *
DISTRIBUTION		
Kenton County		
Zone 1 (first pressure zone)	3201	31
Zone 2 (second pressure zone)	3202	32
Zone 3 (third pressure zone)	3203	33
Covington		
Zone 5 (basin area)	3221	35
Zone 6 (Ida Spence)	3222	36
Zone 7 (Devoe Park)	3223	37
Zone 8 (Boone County)	3224	38
Zone 9 (Cold Spring)	3225	— **
STORAGE		
Kenton County		
Dudley Pike	3301	40
Barrington Road	3302	41
Edgewood	3303	42
Kenton Lands	3304	43
Industrial Park	3305	44
STORAGE (continued)		
Covington		
Bromley	3321	50
Ida Spence	3322	51
Devoe Park	3323	52

* No transmission costs in this zone; therefore, no number assigned.
** No distribution costs in this zone; therefore, no number assigned.

KENTON WATER DISTRICT-COVINGTON
COST CENTER IDENTIFICATIONS (continued)

	COST CENTER NUMBERS	KENTON COUNTY NUMBERS
ACQUISITION SOURCE**		
Kenton County		
Licking River Intake	1101	60
Covington		
Ohio River intake	1120	61
TREATMENT PLANT **		
Kenton County		
Water purification	2101	70
Plant overhead	2201	71
Covington		
Water purification	2120	72
Plant overhead	2220	73
SUPPORT SERVICES **		
Kenton County		
Customer accounts	4101	80
Administrative and general	4201	81
Covington		
Customer accounts	4120	82
Administrative and general	4220	83

** NARUC Account numbers should identify this cost center. (NARUC account numbers to be identified as Kenton County or Covington).

APPENDIX B

KENTON WATER DISTRICT
GENERAL LEDGER ACCOUNTS

KENTON COUNTY ACCOUNT DESCRIPTION	LEDGER ACCOUNT NUMBERS	ALLOCATION CODE	COST CENTERS TO BE CHARGED
Source of Supply			
Operation supervision	600-01	(A)	1101
Operation engineering	600-10	(A)	1101
Operation labor	601-02	(A)	1101
Operation-other expenses	601-50	(A)	1101
Water purchased	602-00	(A)	1401
Building services	603-03	(A)	1101
Ground maintenance	603-25	(A)	1101
Other expenses	603-50	(A)	1101
Maintenance supervision	610-01	(A)	1101
Maintenance engineering	610-10	(A)	1101
Maintenance structures and improvements	611-02	(A)	1101
	611-50	(A)	1101
Maintenance of river intake	613-02	(A)	1101
	613-50	(A)	1101
Maintenance of supply mains	616-02	(A)	1201
	616-50	(A)	1201
Pumping			
Operation supervision	620-01	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Operation engineering	620-10	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Power purchase source	623-05	(A)	1301
Power purchase treatment	623-06	(C)	3401, 2101
Power purchase distribution	623-07	(C)	3402, 3403, 3404, 3405, 3406
Operation labor	624-02	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Communications	624-04	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Lubricants	624-16	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Auto maintenance	624-20	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Auto gas and oil	624-22	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406

KENTON WATER DISTRICT
GENERAL LEDGER ACCOUNTS (continued)

KENTON COUNTY ACCOUNT DESCRIPTION	LEDGER ACCOUNT NUMBERS	ALLOCATION CODE	COST CENTERS TO BE CHARGED
Charts	624-32	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Building services	626-03	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Utilities	626-13	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Grounds maintenance	626-25	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Safety	626-35	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Other expenses	626-50	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Maintenance supervision	630-01	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Maintenance engineering	630-10	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Maintenance structures and improvements	631-02	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
	631-50	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Maintenance equipment	633-02	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
	633-50	(B)	1301, 3401, 3402, 3403, 3404, 3405, 3406
Acquisition maintenance Pumping equipment-labor	633-52	(A)	1301
Acquisition maintenance Pumping equipment-other	633-55	(A)	1301
Treatment plant maintenance Pumping equipment-labor	633-62	(A)	3401
Treatment plant maintenance Pumping equipment-other	633-65	(A)	3401
Distribution maintenance Pumping equipment-labor	633-72	(C)	3402, 3403, 3404, 3405, 3406
Distribution maintenance Pumping equipment-other	633-75	(C)	3402, 3403, 3404, 3405, 3406
Water Treatment			
Operation supervision	640-01	(A)	2201
Operation engineering	640-10	(A)	2201
Chemicals	641-00	(A)	2101
Operation labor	642-02	(A)	2101
Communications	642-04	(A)	2201
Utilities	642-13	(A)	2201
Lubricants	642-16	(A)	2201

KENTON WATER DISTRICT
GENERAL LEDGER ACCOUNTS (continued)

KENTON COUNTY ACCOUNT DESCRIPTION	LEDGER ACCOUNT NUMBERS	ALLOCATION CODE	COST CENTERS TO BE CHARGED
Shop and laboratory	642-17	(A)	2201
Auto maintenance	642-20	(A)	2201
Auto gas and oil	642-22	(A)	2201
Charts	642-32	(A)	2201
Building services	643-03	(A)	2201
Ground maintenance	643-25	(A)	2201
Safety	643-35	(A)	2201
Other expenses	643-50	(A)	2201
Maintenance supervision	650-01	(A)	2201
Maintenance engineering	650-10	(A)	2201
Maintenance structures and improvements	651-02	(A)	2201
	651-50	(A)	2201
Maintenance water treatment equipment	652-02	(A)	2101
	652-50	(A)	2101
Transmission & Distribution			
Operation supervision	660-01	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Operation engineering	660-10	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Tanks ground maintenance	661-25	(B)	3301, 3302, 3303, 3304, 3305
Tanks other expense	661-50	(B)	3301, 3302, 3303, 3304, 3305
Operation labor	662-02	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Tractor expense	662-18	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Compressor expense	662-19	(B)	1201, 3101, 3102, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Auto maintenance	662-20	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Auto gas and oil	662-22	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305,
Other expenses	662-50	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Meter labor	663-02	(B)	3201, 3202, 3203

KENTON WATER DISTRICT
GENERAL LEDGER ACCOUNTS (continued)

KENTON COUNTY ACCOUNT DESCRIPTION	LEDGER ACCOUNT NUMBERS	ALLOCATION CODE	COST CENTERS TO BE CHARGED
Auto maintenance	663-20	(B)	3201, 3202, 3203
Auto gas and oil	663-22	(B)	3201, 3202, 3203
Meters other expenses	663-50	(B)	3201, 3202, 3203
Customer labor	664-02	(B)	3201, 3202, 3203
Auto maintenance	664-20	(B)	3201, 3202, 3203
Auto gas and oil	664-22	(B)	3201, 3202, 3203
Customer other expense	664-50	(B)	3201, 3202, 3203
Communications	665-04	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Utilities	665-13	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Shop and tools	665-17	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Grounds maintenance	665-25	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Safety	665-35	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Other expenses	665-50	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Rents	666-00	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Maintenance supervision	670-01	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Maintenance engineering	670-10	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Maintenance structures and improvements	671-02	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
	671-50	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Maintenance tanks	672-02	(B)	3301, 3302, 3303, 3304, 3305,
	672-50	(B)	3301, 3302, 3303, 3304, 3305,
Maintenance mains	673-02	(B)	3101, 3102, 3103
	673-50	(B)	3101, 3102, 3103

KENTON WATER DISTRICT
GENERAL LEDGER ACCOUNTS (continued)

KENTON COUNTY ACCOUNT DESCRIPTION	LEDGER ACCOUNT NUMBERS	ALLOCATION CODE	COST CENTERS TO BE CHARGED
Maintenance services	675-02	(B)	3201, 3202, 3203
	675-50	(B)	3201, 3202, 3203
Maintenance meters	676-02	(B)	3201, 3202, 3203
	676-50	(B)	3201, 3202, 3203
Maintenance hydrants	677-02	(B)	3201, 3202, 3203
	677-50	(B)	3201, 3202, 3203
Maintenance miscellaneous plant	678-02	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
	678-50	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Equipment expense credit	680-30	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Overhead expense credit	680-31	(B)	1201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305
Customer Accounts			
Operation supervision	901-00	(A)	4101
Meter reading labor	902-02	(A)	4101
Auto maintenance	902-20	(A)	4101
Auto gas and oil	902-22	(A)	4101
Customer records labor	903-02	(A)	4101
Office supplies	903-15	(A)	4101
Contract expense	903-24	(A)	4101
Collection expense	903-26	(A)	4101
Postage	903-30	(A)	4101
Uncollectable accounts	904-00	(A)	4101
Communications	905-04	(A)	4101
Utilities	905-13	(A)	4101
Safety	905-35	(A)	4101
Other expenses	905-50	(A)	4101
Interest expense on deposit guarantees	905-51	(A)	4101
Administrative and General			
Operation supervision and management	920-01	(A)	4201
Building services	921-03	(A)	4201
Communications	921-04	(A)	4201
Utilities	921-13	(A)	4201
Office supplies	921-15	(A)	4201
Auto maintenance	921-20	(A)	4201

KENTON WATER DISTRICT
GENERAL LEDGER ACCOUNTS (continued)

KENTON COUNTY ACCOUNT DESCRIPTION	LEDGER ACCOUNT NUMBERS	ALLOCATION CODE	COST CENTERS TO BE CHARGED
Auto gas and oil	921-22	(A)	4201
Dues and subscriptions	921-28	(A)	4201
Travel	921-29	(A)	4201
Other expenses	921-50	(A)	4201
Professional fees	923-00	(A)	4201
Property insurance	924-00	(A)	4201
Injuries and damages	925-00	(A)	4201
Employee pension and benefits	926-00	(A)	4201
F.I.C.A.	926-21	(A)	4201
Payroll taxes-city	926-23	(A)	4201
Regulatory Commission expense	928-00	(A)	4201
Commissioner fees	930-23	(A)	4201
Other expenses	930-50	(A)	4201
Maintenance of buildings	932-39	(A)	4201
Maintenance of equipment	932-40	(A)	4201
Other expenses	932-50	(A)	4201
O&M Fund - Miscellaneous			
Cost of materials sold	98	(A)	4401
Independence Area:			
Operation supervision	1201	(A)	4302
Operation labor	1202	(A)	4302
Communication	1203-4	(A)	4302
Electricity	1203-5	(A)	4302
Insurance	1203-14	(A)	4302
Office supplies and postage	1203-15	(A)	4302
Maintenance supervision and improvements	1204	(A)	4302
Maintenance of buildings and grounds	1205-02	(A)	4302
	1205-50	(A)	4302
Maintenance of pumps	1206-02	(A)	4302
	1206-50	(A)	4302
Maintenace of equipment and usage	1207-02	(A)	4302
	1207-50	(A)	4302
Water purchased	1209	(A)	4302
Maintenance of mains	1210-02	(A)	4302
	1210-50	(A)	4302
Maintenance of tanks	1211-02	(A)	4302
	1211-50	(A)	4302
Maintenance of services	1212-02	(A)	4302
	1212-50	(A)	4302
Maintenance of meters	1213-02	(A)	4302
	1213-50	(A)	4302

KENTON WATER DISTRICT
GENERAL LEDGER ACCOUNTS (continued)

KENTON COUNTY ACCOUNT DESCRIPTION	LEDGER ACCOUNT NUMBERS	ALLOCATION CODE	COST CENTERS TO BE CHARGED
Maintenance of hydrants	1214-02	(A)	4302
	1214-50	(A)	4302
Customer services	1215	(A)	4302
Meter reading	1217	(A)	4302
Billing service expense	1219	(A)	4302
Professional service	1220	(A)	4302
Turn on/off	1226	(A)	4302
Taylor Mill:			
Supervisory services	1101	(A)	4301
Maintenance and emergency repairs	1102-02	(A)	4301
	1102-50	(A)	4301
Plant Fund			
Interest on notes payable	32-1	(A)	5000
Interest on mortgage loan	32-2	(A)	5000
Maintenance expense (office building)	32-3	(A)	4201
Extraordinary expense	209	(D)	4201, 1101, 1201, 1301, 2101, 2201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305, 3401, 3402, 3403, 3404, 3405, 3406, 4101
Bond Fund			
Interest paid	49	(A)	5000
Depreciation Fund			
Depreciation	250	(D)	4201, 1101, 1201, 1301, 2101, 2201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305, 3401, 3402, 3403, 3404, 3405, 3406
General Fund			
Interest expense	453	(A)	5000
Extraordinary maintenance	455	(D)	4201, 1101, 1201, 1301, 2101, 2201, 3101, 3102, 3103, 3201, 3202, 3203, 3301, 3302, 3303, 3304, 3305, 3401, 3402, 3403, 3404, 3405, 3406, 4101
Office Building Expense			
Leased premises	460	(A)	4201

GLOSSARY

The terms and definitions listed below clarify and establish the usage of the terminology appearing in this report.

acquisition costs: All costs incurred from the point of acquiring water at its source to the point when it enters the treatment process. These costs may include pumping, storage, and transmission.

cost: Expenses incurred to produce and distribute water. Expenses incurred for other purposes, such as the sale of materials, are excluded. Expenditures classified as assets are also excluded from this definition except for depreciation and interest charges resulting from such expenditures.

cost center: A unit that accumulates cost. A cost center with definite boundaries must be identified so that all related costs can be separated. Cost centers are usually part of the physical property of the water utility, such as a pumping station or a storage facility.

delivery costs: All costs for moving the treated water from the treatment process until it is delivered to the customer. These costs include transmission, distribution, storage, and pumping costs.

distribution costs: The costs involved in moving water within a single pressure zone and delivering it to the customers. This cost definition includes all costs incurred to operate and maintain the various components of the distribution system up to and including the meter but excluding the cost of reading the meter. Also excluded are the costs of storage facilities and pumping. As stated before, transmission mains may have a distribution cost element; however, all delivery mains are considered as totally for distribution because no transmission cost element is incurred.

distribution mains: Mains serving the primary purpose of moving water to the consumer. The size of pipe varies, but pipe less than 12 inches in diameter is generally considered distribution.

function cost center: The top level of cost categories generally describing the principal functions of the water utility. There are six individual function cost centers: 1) acquisition, 2) treatment, 3) delivery, 4) support services, 5) interest, and 6) taxes. With the exception of interest and taxes, each function cost center

normally comprises a group of subfunction cost centers.

identification cost center: A third level of cost categories identifying specific components of the subfunction. Examples of identification cost centers under the storage facility subfunction are individual storage tanks located in the delivery area.

interest costs: The cost of money borrowed by the utility.

pumping costs: The cost of operating and maintaining pumping stations, including the cost of power to operate the pump.

storage costs: The costs of operating and maintaining storage facilities. Included are both extraordinary repair costs not capitalized and all routine maintenance costs.
subfunction cost center: A second level of cost categories representing types of cost centers within a function. Examples of of subfunctions under the delivery function are pumping stations and storage facilities.

support services costs: All costs that are not an integral part of operating or maintaining the cost centers that come in physical contact with the water. Examples are insurance, billing, and the salary of a general manager.

tax costs: The costs of fees paid by the utility to a government for the privilege of operating a business. An example is real estate tax on a nonmunicipal utility.

transmission costs: Costs of moving water from one pressure zone to another, exclusive of pumping. Also excluded are the costs of any transmission mains that serve only within a single zone. In a multipressure zone system, most transmission mains incur costs in two subfunctional cost centers. The element of cost involved in moving water through one zone to another zone is a transmission cost; the element of cost involved in moving water within a single zone is a distribution cost.

transmission mains: Mains serving the primary purpose of moving large volumes of water from one pressure zone to another. The size of pipe varies depending on the size of the utility; however, mains 12 inches in diameter or larger are generally considered transmission mains.

treatment costs: All costs incurred in treating the water from the point of entry into the treatment phase until the treatment processes are completed. Included are the indirect costs of operating and maintaining the treatment plant, but excluding any cost centers related to other functions that may take place within the treatment plant. Examples of such nonrelated cost centers to be excluded from the treatment cost center are pumps located in the treatment area to move water into the delivery area.